NON HAZARDOUS CLASS I INJECTION WELL APPLICATION

ATTACHEMENT P.

APPENDIX 2

WASTE MANGEMENT PLAN
OSCEOLA AND MECOSTA COUNTY, MICHIGAN

MICHIGAN POTASH OPERATING, LLC

WASTE MANGEMENT PLAN
OSCEOLA AND MECOSTA COUNTY, MICHIGAN

THE UNITED STATES POTASH PROJECT
JANUARY 2015

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APPENDICES

Appendix A: TriMatrix Laboratories, Inc. - QA/QC Manual

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1.0 INTRODUCTION

1.1 Purpose

Michigan Potash Operating, LLC is applying for a permit to operate Class I NON-HAZARDOUS injection wells for the disposal of salt water, that is, brine created from the processing of food grade sodium chloride, “NaCl” and potassium chloride “KCl.”

The proposed wells are to be operated under the United States Environmental Protection Agency (USEPA) Underground Injection Control program and follow federal rules and regulations as defined in Title 40 of the Code of Federal Regulations.

The requirements of 40 CPR Section 146.13(b)(1) specify that any operator of a Class I underground injection well monitor and analyze the fluids injected into the well such that,

"The analysis of the injected fluids (shall be monitored) with sufficient frequency to yield representative data of their characteristics."

Additionally, 40 CFR Section 146.68(a)(1) specifies that:

"The owner or operator shall develop and follow an approved written waste analysis plan that describes the procedures to be carried out to obtain a detailed chemical and physical analysis of a representative sample of the waste, including the quality assurance procedures used."

This Waste Analysis Plan (WAP) fulfills the applicable requirements of the permit application process as stated in various 40 CPR sections. This document was prepared following guidance as illustrated in the *USEPA Region V Underground Injection Control (UIC) Section Regional Guidance #8* issued January 21, 1994 entitled Preparing a Waste Analysis Plan at Class I Injection Well Facilities.

1.2 Waste Description and Generation

Wastewater consists of an aqueous solution of predominantly composed of water and naturally occurring salt, or sodium chloride and naturally occurring potassium salt, potassium chloride. Both principle constituents are utilized in food and agriculture. Analytical results do not indicate any hazardous constituents.

A typical waste analysis is as follows:

Physical Properties:

	Range	Typical
Specific Gravity	1.0 - 1.2	1.1
pH	5.5 - 8.0	7.0

CONTINUED ON NEXT PAGE

Chemical Characteristics:

Component	Weight Percent
H_2O	variable
NaC1	variable
KC1	variable
SO_4	<0.4
Br	<0.2
Ca	<0.2
Mg	<0.02

Sodium hydroxide is used in the stripping of the H_2S from the production brine. As processes change, scale and/or corrosion inhibitors may be used. There is a slight chance that minute amounts of these chemicals may enter the waste stream.

Biological Characteristics:

Disposal fluid originates primarily from the solution mining of potash and salt and is essentially free of biological matter. Well water used to dissolve the potash may possibly contain biological matter; however, the high salinity of the disposal fluid would cause an overall decline in biological matter content.

Radiological Characteristics:

The disposal fluid will contain trace amounts of the naturally occurring stable C137 isotope and radiogenic K^{40} isotope associated with potassium chloride and sodium chloride.

1.3 Waste Storage Transportation and Disposal

The wastewater generated by the brine production process will be piped to a holding tank then pumped through a dual media (anthracite and sand) filter prior to disposal in the injection well.

1.4 Operating Data

Average injection rate while in operation: 90 - 600 gallons per minute (gpm)

Average injection pressures while in operation: 600 - 1500 pounds per square inch (psig)

1.5 External Transport and Disposal Procedures

Michigan Potash Operating will not allow any fluids or brine to leave Michigan Potash Operating Property. In the event of multiple well failures, the production process will either be halted or the wastewater will be shipped off-site for disposal.

1.6 Project Responsibility

The General Manager, Operations Manager and Production Manager will have the primary responsibility to ensure all WAP conditions are met. The collective management team is also

responsible for coordination and selection of the subcontracted laboratory used to support the analyses associated with this WAP.

TriMatrix Laboratories, Inc. of Grand Rapids, Michigan will be performing the analytical requirements of the WAP. It is the primary responsibility of TriMatrix to ensure that all of the laboratory QA functions are fulfilled.

2.0 SAMPLING ACTIVITIES

The following parameters will be analyzed for one or more of the following reasons:

- required by permit
- required to show that the waste is characteristically non-hazardous per 40 CFR 261
- required per the USEPA Region V guidance document
- required by Michigan Potash Operating for optimal injection well system performance

2.1 Sample Parameters/ Analytical Method/ Sampling Frequently

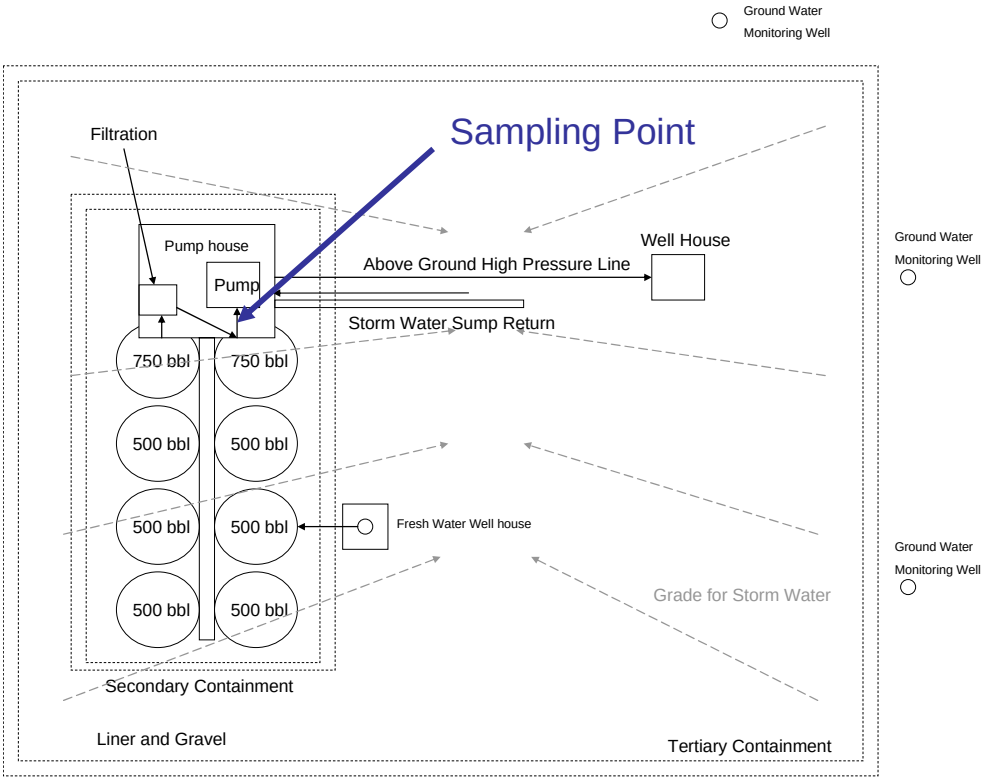
PARAMETER	ANALYTICAL METHOD	SAMPLING FREQUENCY
Barium	USEPA 6010B	Quarterly
Calcium	USEPA 6010B	Quarterly
Cobalt	USEPA 6010B	Quarterly
Copper	USEPA 6010B	Quarterly
Iron	USEPA 6010B	Quarterly
Lead	USEPA 6010B	Quarterly
Magnesium	USEPA 6010B	Quarterly
Manganese	USEPA 6010B	Quarterly
Selenium	USEPA 6020	Quarterly
Sodium	USEPA 6010B	Quarterly
Zinc	USEPA 6010B	Quarterly
Alkalinity, Bicarbonate	USEPA 310.1	Quarterly
Alkalinity, Carbonate	USEPA 310.1	Quarterly
Alkalinity, Total	ASTM D 1246-88	Quarterly
Bromide	USEPA 325.2	Quarterly
Chloride	USEPA 120.1	Quarterly
Conductivity @ 25 C	USEPA 120.1	Quarterly
pH	USEPA 150.1	Quarterly
Oxid/Reduct Potential	ASTM D 1498-76	Quarterly
Residue, Dissolved @ 180 C	USEPA 160.1	Quarterly
Specific Gravity	ASTM D 1429-79	Quarterly
Sulfate	USEPA 375.4	Quarterly
Sulfide	USEPA 376.1	Quarterly
Carbon, Total Organic	USEPA 415.1	Quarterly

2.2 Sampling Frequency Justification

The sampling frequency presented in this WAP is based on permit requirements. As historical data and process knowledge has indicated, the waste stream is consistent relative to analytical test results. As such, the frequency specified will provide the necessary monitoring to insure identification of any potential fluctuations in the stream. Additionally, this WAP allows for supplemental, or modified, sampling when system anomalies are suspected.

2.3 Sampling Location

Michigan Potash Operating has identified a primary sampling location from which injected brine will be collected. The primary sampling point, a manual spigot located at the discharge point of the final filtration unit and the suction of the injection pumps, will be used for all specified sampling events. This spigot is located on the wastewater main discharge line, such that no other piping is connected to the main prior to the wellhead. The sampling location is illustrated below on the site security diagram.



2.4 Sampling Protocol

The sampling protocols include the collection of operational data at the wellhead and the collection of samples at the appropriate sample point.

2.4.1 Sampling Protocol (Analytical)

Sampling will be performed quarterly. The sample will be obtained at the primary sample point by carefully opening the spigot valve to allow the sample to flush to the local sump drain for one minute. After the flush period, appropriate sample containers will be filled with the final filtered wastewater (annually a second set of containers will be filled as a field duplicate.)

Each sample container is labeled with the:

- date of collection
- time of collection
- sampler initials
- sample ID

A Chain-of-Custody will be initiated that includes:

- date of collection
- time of collection
- sampler signature
- sample ID
- analyses to be performed
- pertinent sampling notes

2.5 Sampling Personnel

Only those Michigan Potash Operating individuals who are thoroughly familiar with the safety and operational characteristics of the injection well system and the requirements of this document will perform or assist in sampling.

The Michigan Potash Operating sampling staff will possess site familiar training in the proper sampling protocols specified in this WAP. Additionally, they will possess the required training and site knowledge to perform the sampling tasks safely.

Michigan Potash Operating personnel will be primarily responsible for the operation, maintenance and corrective action documentation of the injection well system.

Michigan Potash Operating sampling personnel will be primarily responsible for coordinating sampling activities with the lab, performing sampling as outlined in Section 2.4, preparing and completing all required sample labels and chain-of-custody (COC) and for assuring transportation of samples to the laboratory for analysis.

2.6 Chain-of-Custody

The following COC procedures have been developed to insure that all samples collected remain intact and representative, until all analytical procedures are conducted. These procedures include both field and laboratory custody requirements.

2.6.1 Field Custody Procedures

Sample containers are labeled as indicated in Section 2.4 immediately after collection. A COC is initiated in the field at the time of collection. The samples and COC are sent by the field sampling technician to the laboratory.

Upon receipt of the sample at the laboratory, the COC is signed as received by the sample custodian, the sample information is recorded in a log and the sample is released to the laboratory for testing.

2.6.2 Laboratory Custody Procedures

TriMatrix Laboratories, Inc. has incorporated strict procedures for sample custody. The entire TriMatrix QA/QC manual is attached as Appendix A. These guidelines were established to maintain the custody of samples in the laboratory and the legal validity of results generated.

The sample custody procedure outlines the general procedures utilized in the processing of all samples received. The following, where applicable, are to be considered minimum requirements. Appendix A contains specific details utilized by TriMatrix for sample receipt, login, storage, internal sample transfer, storage, analysis, and disposal.

2.6.3 Sample Custody Procedure

This procedure is designed to outline the general processes used to initiate and maintain sample custody for samples received at the laboratory. These procedures have been instituted to insure that proper sample custody has been established upon receipt and that this custody is maintained during the entire analytical process. Detailed procedures are specified in Appendix A.

General Procedure:

When a sample cooler is received, a sample login is immediately initiated. The cooler is inspected externally to determine if any obvious leakage has occurred. The cooler seals are broken and the COC is removed. The cooler contents are inspected for obvious damage or leaks. A thermometer is used to measure the temperature of the samples, and the receipt temperature is recorded on the COC. Upon completion of inspection, the COC is checked against the bottles received. The COC is reviewed and signed.

All samples received at the laboratory are logged into a laboratory data management system, which assigns a unique laboratory sample number to each sample. Each container for a given sample is issued a unique container identification number.

Login personnel determine which analysis is required for a given sample from the information provided on the COC. The COC information is entered into the laboratory data management system.

The sample COC, check list, and any other shipping paperwork are placed into a project file, which is then given to the applicable laboratory project manager who verifies the receipt of the sample, COC information, and analyses logged into the database system.

Labels are generated for each sample container. These labels are durable, water resistant, and printed with indelible ink. The labels include the following information:

- sample number
- client name
- client sample ID
- date received
- date collected
- preservative (if any)
- required tests from that container

The sample number serves as the container identification number. Where multiple containers are received for a given container type, they are further identified with a container identification in the format of "1 of 3". This sample number and container number format provides a link between sample analysis and the container used.

Samples are placed in a cooler (maintained at (C). Access to the cooler and samples are limited to the technical staff of the laboratory. Sample security is maintained through secured limited access areas.

2.7 Bottles and Preservatives

All samples will be collected in appropriate sample containers supplied by the laboratory. Depending on the analysis involved, chemical preservatives may or may not be necessary. Samples will be transported on ice and stored refrigerated at 4 +/- 2 deg C.

2.8 Sample Transport

All samples will be packaged in a cooler with sufficient ice and packing material. Caution will be taken during handling and transport of the samples to ensure that the sample containers are not damaged.

3.0 ANALYSIS INFORMATION

3.1 Analytical Procedures

Analytical methods are listed in Section 2.1 of the WAP. It is understood that these are the base parameters, and circumstances may necessitate the need for additional testing.

Appendix A details aspects of the analytical parameters, including typical lower quantization limits, analytical method references, units of reporting, and holding times.

3.2 Parameter and Quantization Limit Justification

The parameters selected for analysis under the WAP are representative of those necessary to monitor and characterize the injected brine. These parameters are analyzed to determine compliance with the UIC permit, and to insure that the injected brine characteristics are consistent.

The parameters selected for analysis under this WAP are consistent with the requirements of the UIC permit. The provision for waste re-characterization, provided in this WAP, eliminates the need for additional routine analyses.

The quantization limits as outlined in Appendix A, reflect realistic levels of detection that can be reasonably reproduced to insure permit compliance, and to allow for the obvious effects of the sample matrix. These limits should be achievable for the analysis indicated, however, when not obtainable, adequate documentation for matrix interference will be provided.

3.3 Waste Re-characterization

In the event that a significant change is suspected or detected in the injected brine, a provision for waste re-characterization will be implemented. An immediate sampling/resampling of the waste stream will be performed and analyzed for all parameters specified in Section 2.1. This sample will be drawn from the primary sampling point as described in Section 2.3.

Waste re-characterization will be used to determine that the waste being injected into the injection well system is stable, and that any injected brine variation will not impact the underground injection process.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 Field QA/QC

The following general procedures will be followed by sampling personnel: 4.1.1 Equipment Blanks

Samples for this WAP are drawn from a free flowing spigot, therefore all sampling equipment and containers are dedicated. Equipment Blanks will not be required.

4.1.2 Trip Blanks

A trip blank will be prepared by the laboratory using preserved containers (as applicable) and filled with reagent grade water. The trip blank will follow the sample containers to the site and through the entire collection and transportation process.

4.1.3 Field Duplicates

Field duplicates are representative samples taken at the same time of normal sampling using similar sampling techniques. The field duplicates are identified in a generic fashion to limit laboratory knowledge of the sample source. Field duplicates will be analyzed for all parameters. Field duplicates will be analyzed at a frequency equivalent to at least one (1) per calendar year. Additional field duplicates may be required to investigate specific parameters or analytical processes.

4.2 Laboratory QA/QC

This section presents the general QA/QC requirements applicable to the analysis of environmental samples, as well as the methods for assessing data quality. The purpose of the QA/QC program is to produce data of known quality that is legally defensible, satisfies applicable data quality objectives (DQOs), and meet or exceed the requirements of the WAP.

Performance of all analytical methods is monitored to assess the accuracy and precision of the procedure. Specific quality control checks are designed to provide the necessary information for method assessment.

The following general elements apply to the chemical analyses performed in the laboratory.
TriMatrix Laboratories, Inc., a third party firm, has provided a lengthy, detailed QA/QC program for their specific operations that is attached to this WAP as Appendix A.

4.2.1 Elements of Quality Control - Chemical

A preparation batch is a group of samples that are carried through an applicable preparation technique (e.g. digestion, distillation, or extraction) at the same time using the same reagents and conditions. An analytical batch is a batch of samples that are analyzed using the same instrument and conditions within the same time period. The identity of each batch is unambiguously recorded as a unique "Batch ID" so that a reviewer can identify the QC samples associated with a group of samples.

The type of QC samples that may be utilized and their use are identified below. The specifics regarding frequency, acceptance criteria, and corrective action are included Appendix A. Specifics regarding the requirements of these QC samples are detailed in the individual standard operating procedures.

4.2.2 Calibration

Instruments and support equipment are calibrated in accordance with the referenced analytical methods. Details of calibration procedures are contained in the laboratory SOPs. For the analyses selected, all target analytes are included in initial and continuing calibrations regardless of their need in a given environmental sample.

If the calibration acceptance criteria are not met, the operating curve may be narrowed either by eliminating the low point or high point of the curve (providing all project criteria are still met.) For multi-analyze calibrations, specific analysts may be eliminated from the low or high points. Otherwise, the entire calibration curve is repeated. Elimination of any of the inner levels of the calibration in order to meet QC acceptance criteria is allowed provided that all analytes are eliminated in that level and the required minimum number of calibrated levels remain.

4.2.3 Surrogates (SURR)

Surrogates are used to evaluate accuracy, method performance, and extraction efficiency in organic procedures. Surrogates shall be added to environmental samples, quality control samples, and blanks.

4.2.4 Initial Calibration Verification (ICY)

A second source standard containing all target analytes is analyzed after each initial curve, to verify the validity of the calibration. This standard must be from a separate source or lot number from that used for calibration. Unless specified in the reference method, the ICV is at a concentration near the midpoint of the calibration range.

If the acceptance criteria are not met for the ICV, corrective action steps will include the following. When deemed appropriate, the analyst may take lesser corrective action.

- Perform corrective action (e.g. prepare new standard, rinse system, etc.) analyze another calibration verification. If acceptance criteria are not met in this second consecutive (immediate) calibration verification, then perform one of the following. Either,
- demonstrate performance after corrective action with two consecutive successful calibration verifications, or
- A new initial instrument calibration must be performed.

The acceptance criteria must be met before samples can be analyzed. However, sample data associated with unacceptable calibration verification may be reported if the verification indicates high bias and the samples indicate non-detectable concentration, or if the project DQOs are met and an appropriate qualifier is reported.

4.2.5 Initial Calibration Blank (ICB)

A reagent blank is analyzed after the ICY and prior to the analysis of environmental samples. A blank may also be analyzed after high concentration samples to demonstrate that carryover contamination does not exist.

Samples associated with an ICB indicating high bias may be reported if the samples indicate non-detectable concentration, or if the project DQOs are met and an appropriate qualifier is reported.

4.2.6 Interference Check Sample (ICS)

Interference check samples are used in inductively coupled plasma analyses to verify background and inter-element correction factors.

Samples associated with an ICS indicating high bias may be reported if the samples indicate non-detectable concentration, or if the project DQOs are met and an appropriate qualifier is reported.

4.2.7 Method Blank (MB)

The method blank goes through all applicable preparation steps and is used to document non-contamination of the entire analytical process.

The MB is considered a batch control parameter. Samples associated with a MB indicating high bias are re-prepared and analyzed. The only exceptions are samples that indicate a non-detectable concentration despite the MB result, or where the project DQOs are met and an appropriate qualifier is reported.

4.2.8 Laboratory Control Sample (LCS)

The LCS is prepared with analyte-free water or, where available, a purchased solid matrix spiked with representative analytes. The LCS shall be spiked with a second source standard at a level near or below the midpoint of the calibration curve for each analyte. This QC sample shall be carried through the entire preparatory and analytical procedure to document the accuracy of the entire analytical process.

The LCS is considered a batch control parameter. Samples associated with aLCS that fails to meet the acceptance criteria for recovery are re-prepared and analyzed. The only exceptions are samples that indicate a non-detectable concentration when the LCS indicates high bias, or where the project DQOs are met and an appropriate qualifier is reported.

4.2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A matrix spike and matrix spike duplicate are separate aliquots of sample spiked with known concentrations of analyte using a second source standard. The spiking occurs prior to sample preparation and analysis. Samples used for the MS/MSD are chosen at random. This allows for the evaluation of all sample matrices over time. The MS and MSD shall be spiked at a level less than or equal to the midpoint of the calibration curve.

The MS/MSD are matrix-specific quality control samples and are used to assess the bias for accuracy and precision of a method in a given sample matrix. The MS/MSD accuracy recovery is not solely used to assess batch control.

Samples having an indigenous concentration greater than or equal to 4 times the spiked amount are considered not applicable for spike analysis at that level. Where the sample chosen for MS/MSD analysis is one of a group of samples submitted from a site with homogeneous character and the MS/MSD require that the sample is re-prepared and analyzed, all samples from that Sample Delivery Group should be re-analyzed under similar conditions. If the acceptance criteria are not met in two separately prepared analyses, the failure is considered matrix specific for that sample and the results yielding better recovery are reported with an appropriate qualifier.

4.2.10 Duplicate (DUP)

Applicable to analyses where MS/MSD are not, duplicate samples are analyzed using identical recovery techniques and treated in an identical manner. Duplicate sample results are used to assess the precision of the entire analytical process. Samples used for the DUP are chosen at random. This allows for the evaluation of all sample matrices over time.

The DUP is a matrix-specific quality control sample and is used to assess the bias of a method due to a given sample matrix. The DUP is not used to solely assess batch control. If the acceptance criteria (%RPD) are not met, the sample and its duplicate must be re-prepared and analyzed. Relative Percent Difference is calculated only where the two values are greater than or equal to 5 times the PQL. If the values are below 5 times the PQL, the acceptance criteria are ± 1 PQL of each other.

Where the sample chosen for duplicate analysis is one of a group of samples submitted from a site with homogeneous character and the DUP requires that the sample is re-prepared and analyzed, all samples from that Sample Delivery Group should be re-analyzed under similar conditions. If the acceptance criteria are not met in two separately prepared analyses, the failure is considered matrix specific for that sample and the results yielding better recovery are reported with an appropriate qualifier.

4.2.11 Post-digestion Spikes (PDS)

A PDS is applicable only to digested metals analyses and those general chemistry (wet chemistry) analyses that include a preparation step (e.g. cyanide, nitrogen - ammonia, and phenolics). A post-digestion spike may be analyzed to assist in the assessment of matrix interference when the MS and MSD fail to meet the accuracy acceptance criteria. In addition, a PDS can be used as a troubleshooting tool. The spiking solution is added to a sample aliquot just prior to analysis thereby evaluating the matrix effect on the analysis process only and not the preparation portion. Samples having an indigenous concentration greater than or equal to 4 times the spiked amount are considered not applicable for spike analysis at that level.

If the MS/MDS fail to meet the accuracy acceptance criteria and the PDS is within the acceptance criteria, matrix interference should be suspected. If the MS/MSD and PDS fail to meet the accuracy acceptance criteria, matrix interference is probable and the sample, MS/MSD, and PDS should be prepared and analyzed. A smaller sample size should be considered as means to negate the apparent matrix interference.

4.2.12 Serial Dilution (SD)

As a troubleshooting tool, it may be necessary to analyze a serial dilution of a sample. The results of a 1:5 serial dilution should agree with each other within 5% (unless stated otherwise in the reference method). These criteria are for evaluating the matrix effect in a new or unusual matrix and not for comparing results for a sample diluted because it was above the calibration range of the instrument.

4.2.13 Continuing Calibration Verification (CCV)

A second source standard containing all target analytes is analyzed to verify that the calibration curve remains valid. This standard must be from a separate source or lot number from that used for calibration. Unless specified in the reference method, the ICV is at a concentration equivalent to the midpoint of the calibration range.

If the acceptance criteria are not met for the CCV corrective action steps include the following. When deemed appropriate, the analyst may take lesser corrective action.

- Perform corrective action (e.g. prepare new standard, rinse system, etc.)
- Analyze another calibration verification. If acceptance criteria are not met in this second consecutive (immediate) calibration verification, then perform one of the following. Either,
- demonstrate performance after corrective action with two consecutive successful calibration verifications, or
- A new initial instrument calibration must be performed.

Sample data associated with unacceptable calibration verification may be reported if the verification indicates high bias and the samples indicate non-detectable concentration, or if the project DQOs are met and an appropriate qualifier is reported.

4.2.14 Continuing Calibration Blank (CCB)

A reagent blank is analyzed after the CCV. A blank may also be analyzed after high concentration samples to demonstrate that carryover contamination does not exist.

Samples associated with a CCB indicating high bias may be reported if the samples indicate non-detectable concentration, or if the project DQOs are met and an appropriate qualifier is reported.

4.2.15 Control Charts/Tabulations

Control chart-type data are retained by the laboratory for all quality control sample types. Where allowed by the reference method, laboratory generated acceptance limits may be statistically prepared for Surrogate recovery, LCS recovery, MS recovery for accuracy, and MSD/DUP recovery for precision. Statistical outliers are removed and a minimum of the 50 most recent data points is used to update the limits. When used, lab generated acceptance limits are updated on a minimum annual basis. Control limits are established at the average plus-and-minus three standard deviations ($X \pm 30\ n\_1$) unless otherwise required in the reference method.

4.2.16 Subsampling

When removing a portion of an environmental sample, appropriate care and technique is used in order to obtain a representative sub-sample. For water samples this includes thoroughly shaking the sample container in order to mix any solids. It is appropriate to shake filtered groundwater samples as any particulate in the filtrate is from the original sample. For solid and semi-solid samples this includes stirring the sample in order to homogenize any stratified layers within the sample container. These techniques do not apply to removing an aliquot for the analysis of total organic halides (TOX), or total organic carbon (TOC).

4.2.17 Sample Containers

Most containers are purchased certified clean from a commercial vendor. These containers are ready for use and require no additional monitoring prior to use. Containers that are purchased without certification will be verified clean prior to shipment.

4.3 Calibration Procedures - Laboratory Analyses

All analytical calibration procedures utilized at TriMatrix have been developed to meet or exceed the requirements specified in SW-846, (current) edition, and EPA 600/4-79/020. These procedures are strictly adhered to at all times.

4.3.1 Accuracy and Traceability of Calibration Standards

All standards and reagents are tracked from their initial preparation through their use in the preparation and analytical batches. Standards purchased from an outside vendor are, where available, traceable to the National Institute of Standards Technology (NIST). A Certificate of Analysis, or similar document of traceability, is kept in the appropriate standards preparation log. Purchased standards may be used at their prepared and labeled concentration without further verification.

Standards preparation and reagent preparation logbooks are maintained throughout the laboratory. Each logbook is labeled with the laboratory name, unique name/purpose of the logbook, logbook number, the "start date" and the "end date".

Each stock standard, subsequent dilution, and prepared reagent is given a unique tracking number. When preparing dilutions of a standard the following information is included in the standards log:

- standard source lot number
- standard name
- expiration date
- initials of the preparer
- date prepared
- detailed information of the volume/mass used
- final volume prepared
- diluent
- prepared concentration

The expiration date of a prepared standard is that date on which the stock solution expires. In mixes where there is more than one expiration date for the stock solutions, the earliest date is chosen as the expiration date for the entire mix. Each container is labeled with standard or reagent name, concentration, tracing number, and the expiration date. Containers too small for a label with the required information are labeled with a minimum of the logbook reference number and expiration date. Expired standards are discarded and are not used for the generation of analytical data. Standards are prepared using glassware and delivering devices of known and acceptable accuracy.

4.4 Data Reduction, Review, Reporting - Field Analyses

Data reduction for field analyses involves the direct recording of values from various meters and instruments. All results generated from field analyses consist of values read directly from continuous monitoring meters. Therefore, no calculations are required in producing the final reported results.

Where it may be applicable, field analysis raw data is reviewed by Mosaic personnel for accuracy and completeness. Particular attention is paid to the maximum and minimum values recorded, as these

values are compared to permit limits for compliance purposes.

4.5 Data Reduction, Review, Reporting - Laboratory Data

Data reduction involves the handling of raw sample data including, but not limited to, detector response, electrode potential readings, titrant volumes, and gravimetric measurements to achieve final sample concentrations. Automated systems are used for calculation and reduction wherever feasible.

4.5.1 Data Review

A two-tier technical review of all data is performed and documented. 4.5.1.1 1' Level Technical Review

The laboratory technician performing an analysis reviews all of their own data and is responsible for ensuring that the calculations were properly performed and the quality control requirements were met. A data review checklist is initiated by the technician to document this review. The data review checklist is then given to a peer knowledgeable with the current requirements of that analytical procedure, a senior technician, unit supervisor, or the QA/QC director.

4.5.1.2 2nd Level Technical Review

A peer, senior technician, unit supervisor, or the QA/QC director reviews the data by repeating the verification performed by the laboratory technician. This step is documented through use of the data review checklist.

Acceptable data is then available for review in the laboratory data management system. This is performed through the "QA Validation" function of the database. Anyone able to perform the 1st Level or 2nd Level Technical review can "validate" the data in the database. This step approves the data for release.

4.5.2 Project Manager Review

Before the data is released, a project manager will review all final reports for consistency and completeness to ensure that the data meet the overall data quality objectives of the project. This review is intended to verify that those analyses requested on the COC have been performed, the sample information is accurate, and the appropriate data qualifiers have been added.

4.5.3 Quality Assurance Review

In addition to the tiered review process, the quality assurance department will periodically perform data audits. These audits, required as part of the laboratory quality systems audit program, can be performed for the generation of reports that include quality control data, and as a troubleshooting measure. Batches that are reviewed are chosen on random basis and recreate the calculations of all samples in a given batch.

4.5.4 Reporting

For each sampling event/sample delivery group, TriMatrix will prepare an analytical report. The analytical report, accompanied by a cover letter will generally contain the following elements.

- Laboratory name, address, and phone number

- Title of "Analytical Results"
- Date reported
- Client name (with address on the cover letter)
- Client project ID
- Work Order and Sample Number
- Client sample identification and description
- Client defined matrix
- Collection date and received date
- Analyze
- Result (at client requested reporting limits and units)
- Reporting limit
- Units
- Applicable data qualifiers and dilution factor
- Date of analysis
- Analytical method reference
- Date of sample preparation
- Analyst initials
- Page numbering

The original chain-of-custody form and the login checklist will be returned with each report. Any deviations from the requirements of the laboratory sample acceptance policy will be noted in the final report on either the cover letter or the login checklist.

4.5.4.1 Report Archive

Analytical reports generated as part of the injection well waste analysis sampling will be archived by TriMatrix. Individual reports will be maintained in the work order file organized by work order number.

4.6 Internal Laboratory Audits

The purpose of auditing is to identify whether the lab is generating scientifically sound and defensible data, and that daily operating systems meet the requirements of this quality assurance plan. It is the responsibility of the laboratory QA Director to perform periodic performance audits and system audits.

4.6.1 Performance Audits

Performance audits are conducted periodically throughout the year. Performance audits include proficiency testing samples and detailed data reviews. Findings from these audits are used to evaluate the defensibility and data quality produced by the analytical system, randomly selected samples from various test methods are evaluated in this process. Deficiencies from these audits are discussed with the analyst. Copies of the reports from these audits are forwarded to the unit supervisors and summarized for upper management in the annual system audit report.

4.6.2 System Audits

A systems audit is performed on a minimum annual basis. The systems audit is a comprehensive review of the overall quality and measurement system. The purpose of these audits is to confirm compliance with the requirements of the Quality Assurance Plan, and to assess the applicability of the quality system

to other certification and regulatory programs. Systems audits identify the presence of the necessary organization, facility, and quality systems needed to provide evidence of the laboratory's capability and competence. Copies of the reports from these audits are forwarded to upper management.

4.7 Laboratory Corrective Action Procedures

Corrective action is necessary whenever deviations from requirements of the quality system occur. System corrective action is described in this section.

4.7.1 System Corrective Action

The QA department typically initiates corrective action. This type of action is usually initiated due to poor performance audit results, poor system audit results, or unacceptable results on performance testing samples. Either the unit supervisor or their designee is responsible for investigating the problem and determining the corrective action needed. When the source of the problem has been identified and corrective action suggested, a written record is completed, evaluated and, if appropriate, approved by the unit supervisor and QA department. Documentation of each corrective action is kept on file. The forms used are numbered and monitored by the QA department to ensure that out of control events and actions are documented, and that the corrective actions are appropriate, effective, and complete.

Regardless of the source or projected impact on the system failure, the following systematic approach is used in developing a suitable corrective action. The emphasis of the corrective action is to prevent the problem from reoccurring.

- Define the problem
- Establish the root cause of the problem
- Determine the needed action to resolve the problem and eliminate the root cause
- Assign responsibility for implementing corrective action
- Verify the corrective action has been implemented and has eliminated the problem
-

5.0 SAFETY

5.1 Safety Guidelines

Sampling activities at Mosaic will be conducted with the proper personal protective equipment (PPE). Sampling activity will generally be conducted using Level D PPE. The following is a list of specific items to be used by field personnel as defined by Safety Level D:

- Hard Hat
- Safety Glasses with side shields
- Safety shoes
- Heavy work clothes covering legs, shoulders and arms
- Safety gloves

Caution must be exercised at all times when performing sampling activities. In and around the area of the injection well system various mechanical hazards exist.

MICHIGAN POTASH OPERATING, LLC

WASTE MANGEMENT PLAN
OSCEOLA AND MECOSTA COUNTY, MICHIGAN

APPENDIX A
TRIMAX QA/QC MANUAL

Quality Assurance Manual

Analytical Services

Release Date May, 2012

Prepared by:
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1.0 TITLE PAGE

QUALITY ASSURANCE MANUAL

Policies and Procedures Required of the Personnel Employed by TriMatrix Laboratories, Inc., Including the Organic, Inorganic, and Metals Laboratory Areas

Revision Number: 8.0

Effective Date: May 2012

Initial Approvals:

Quality Assurance Manager: _____ Date: 5/11/12

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Quality Assurance Manager: _____ Date: _____

Quality Assurance Manager: _____ Date: _____

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8.0 GLOSSARY OF TERMS

3.0 QUALITY SYSTEM

3.1 INTRODUCTION: THE TriMatrix QUALITY SYSTEM

3.1.1 Manual Purpose

The purpose of this manual is to outline the organization, specify the procedures, and define the technical requirements utilized by TriMatrix Laboratories, Inc. The goal is to ensure that all data generated is of the required quality, reproducible, and generated in a timely manner. This manual details a Quality Assurance/Quality Control (QA/QC) program encompassing the entire analytical efforts at TriMatrix, from project initiation to report generation. Some areas are covered with only a cursory discussion while others are covered in detail or are included in more than one section, depending on their importance. This manual describes the realistic functions of the quality programs in place, with an understanding that not every situation is covered nor every contingency explored.

3.1.2 The Need for Analytical Quality Assurance/Quality Control

In the increasingly competitive business of environmental laboratory services, the primary tenet of continued success is to efficiently provide results of the necessary quality. TriMatrix agrees with this tenet, considers analytical quality assurance and quality control to be of prime importance, and has incorporated it as the central pillar of our efforts to remain on the leading edge of the environmental laboratory field. The requirements we place on ourselves are in concert with the needs and agendas of other organizations, such as the Environmental Protection Agency (EPA), governmental and industrial clients, and various state and local regulatory agencies.

Quality assurance and quality control (QA/QC) functions absorb nearly fifty percent of the available effort involved in routine analysis and continues to evolve and grow in importance. This level of quality is absolutely essential for two reasons: accurate analytical data is obtained only with the concurrent use of extensive QA/QC to regulate and monitor the many process variables that can potentially introduce errors into chemical analyses, and clients make crucial business decisions based on the data supplied by the laboratory. Lab

data not properly supported by adequate quality assurance/quality control practices and procedures can be questionable at best, and can lead to faulty or erroneous decisions in the field. In the overall analytical effort the additional time spent for QA/QC is time necessarily spent.

3.1.3 Definition of Terms

3.1.3.1 Quality Assurance

Quality Assurance (QA) is defined as those operations and procedures undertaken to provide measurement data of documentable quality that have a stated probability of being accurate. The measurement system part of the quality assurance program must be in statistical control to justify this probability statement.

The operations and procedures established as part of the overall quality assurance program encompass all aspects of the laboratory operations, including but not limited to: organizational structure, human resources, physical resources, methodology, analyst training and certification, data reduction, data validation, and instrument maintenance and troubleshooting. All aspects of QA are organized, implemented, and monitored through written standard operating procedures.

3.1.3.2 Quality Control

Quality control is defined as the basic checks necessary to produce a good measurement program. These checks include but are not limited to: proper calibration and calibration verification, statistical monitoring of accuracy and precision, quality control samples (e.g. laboratory control samples, blanks, duplicates, spikes, etc.), interference monitoring, and reagent control.

Adequate records are maintained to support data quality, to locate assignable causes in measurement problems, to improve the

accuracy and precision of the measurement system, and to provide a historical record of traceability.

3.1.3.3 Quality Assessment

Quality assessment is defined as those specific steps utilized to evaluate the quality of the measurement process. These steps include use of control charts to plot multiple data points over time, monitoring parameters by statistical control, internal performance audits, external performance audits, certification programs conducted by individual states, and performance evaluation sample programs.

3.2 QUALITY POLICY STATEMENTS FROM MANAGEMENT

As communicated from top management through the entire organization, TriMatrix Laboratories, Inc. is driven by the following quality objectives and commitments.

3.2.1 Corporate Quality Objectives

- To create and maintain a uniform and controlled pattern for performing routine tasks within the organization, based on standard operating procedures.
- To generate legally defensible, scientifically sound laboratory data of documented quality.
- To build quality into the workplace; ensuring services contributing to successful relationships with our customers, employees, and vendors.
- To develop, deliver, and maintain, excellence in all operational areas.
- To provide a service that consistently meets or exceeds client expectations.

3.2.2 Corporate Quality Commitments

- To support quality by underwriting the substantial cost of the quality commitment even though such expenses do not result in increased productivity or a tangible product.

- To maintain a work environment in which all employees are free from commercial pressures in the performance of their duties.

- To maintain a work environment in which all employees are free from internal organization or external client related pressures that may influence the quality of their work.

- To educate all employees in fraud prevention and their ethical responsibilities associated with analytical and data reporting activities.

- To ensure that client confidentiality and information are strictly protected.

- To implement on-going improvement in every area of laboratory activity.

- To create and maintain a Quality Environment with an all-encompassing determination to meet the needs and quality objectives of our clients.

- To commit and adhere to the requirements specified in ISO/IEC 17025.

- To commit and adhere to the requirements specified by the NELAC Standards.

- To commit and adhere to the requirements specified by the DoD QSM.

Included with these improvements and commitments is an annual review process where the management of TriMatrix Laboratories performs a comprehensive review of the quality system. This review monitors the effectiveness of the quality system and provides feedback for on-going improvement. Policy changes made as a result of the annual review will be reflected in the QA Manual and laboratory standard operating procedures.

3.3 ORGANIZATION AND RESPONSIBILITIES

An efficient organizational operation requires a quality control program facilitating a high level of multi-directional communication and information flow. Each person in the

TriMatrix organization inputs and receives information from the quality system. This information flow optimizes management directives with minimum disruption, and provides the means for creating improvements.

3.3.1 Corporate Structure

Flow of both administrative and quality control information is presented in Figure 3-1. This diagram graphically displays the corporate philosophy concerning the interaction of QA/QC and the generation of analytical data. The general flow of data in this format gives QA/QC independence in fulfilling its function while still acting as a liaison with the administrative staff. To further explain this interaction, a detailed description of roles and responsibilities is presented for each key laboratory position.

3.3.2 Laboratory President

Responsibilities of the Laboratory President are directed at the overall operation and management of the laboratory. Primary responsibilities include, but are not limited to: 1) develop and meet budgets established for the laboratory, 2) manage analytical services productivity and quality, 3) oversee and develop new business activities including client relations development, 4) plan analytical services organization, leadership and management programs, 5) develop and manage human resources including career path planning, and 6) performing duties as Deputy Technical Director when necessary or when the Technical Director will be absent for more than 15 days.

3.3.3 Quality Assurance Manager

The Quality Assurance Manager is primarily responsible for the implementation, maintenance, reporting, and development of all QA/QC activities performed within the laboratory. Duties include, but are not limited to: 1) QA/QC systems development and monitoring, 2) coordination of all documentation procedures including the development and control of standard operation procedures, 3) monitoring method and quality control requirements as published by regulatory agencies, ISO/IEC 17025, the Department of Defense QSM, and the NELAC Standards, 4) performing internal lab audits, 5) maintaining in-house QA/QC monitoring procedures and policies, and 6) providing quality assurance guidance and training to all staff members. The

Quality Assurance Manager has the authority to stop work as a result of poor data quality.

3.3.4 Technical Director

The Technical Director is responsible for the overall technical capabilities and direction of the laboratory. Specific responsibilities include: 1) organization and management of new analytical technologies developed by the laboratory, 2) adherence to ISO/IEC 17025, the Department of Defense QSM, and the NELAC Standards, 3) equipment procurement management.

3.3.5 Health and Safety Officer

The Health and Safety Officer is responsible for development and maintenance of health and safety programs and manuals. Specific responsibilities include: 1) the implementation, monitoring, and maintenance of all laboratory safety and chemical hygiene programs, 2) monitoring and managing laboratory waste disposal.

3.3.6 Deputy Quality Assurance Manager/Deputy Technical Director

The Deputy Quality Assurance Manager/Deputy Technical Director is an integral part of the Quality Team. The position assists in performing QA/QC and technical functions at the level established by management for the position, including: 1) helps verify that QA and QC systems are commensurate with client expectations, 2) centralizes data related to Quality Assurance for the purpose of preparing weekly, monthly and annual reports, 3) monitors, via the quality control system, the quality assurance of work performed by the laboratory and subcontractors, 4) complies with policies and procedures in all areas impacting the business, including operational, commercial, financial, administrative, and HR practices, 6) adheres to all legislative requirements associated with laboratory operations, 7) maintains the highest ethical standards in dealing with all persons, 8) supports the quality team and proposes alternative courses of action, wherever possible, to facilitate and expedite continuous quality improvement, 9) assists in reviewing laboratory work, 10) assists in internal and external third-party auditing, and responses, 11) supports laboratory supervisors by developing/designing relevant quality procedures and quality plans of action, 12) supports training and mentoring of

laboratory personnel by transfer of knowledge, 13) performs similar, other, or related duties when assigned by laboratory Management. The Deputy Quality Assurance Manager/Deputy Technical Director reports to the Quality Assurance Manager.

3.3.7 Sales and Marketing Staff

The Sales and Marketing Staff are responsible for all marketing, business development, and client maintenance activities. These activities include but are not necessarily limited to: 1) market research/gathering market intelligence, 2) consulting with company management to develop a corporate business strategy and plan, 3) development and implementation of a corporate image campaign, 4) development and distribution of marketing materials (corporate literature, etc.), 5) client prospecting, 6) presenting/introducing company services to prospective clients, 7) account development, management and maintenance (in conjunction with Project Chemists), 8) development of corporate pricing guidelines, 9) development of proposals, quotations, bids and qualifications summaries, and 10) contract review, negotiation and execution.

3.3.8 Organizational Chart

Presented in Figure 3-2 is an organizational chart illustrating the personnel structure within the laboratory.

3.4 RELATIONSHIPS

Relationships within the analytical laboratory are organized through management into three main categories: Technical Operations, Support Services, and the Laboratory Quality System. The relationships between management and these operations define and maintain the delicate balance in a cost-effective, highly-technical, quality laboratory operation. An overview of each relation is presented below:

3.4.1 Management-Technical Operations

The relationship between management and technical operations is illustrated in Figure 3-3. In this relationship, the main role of management is to provide guidance and financial support to the programs and directives of the Technical Director. Through this structure, technical operational enhancements and developments occur and are applied through the laboratory staff.

3.4.2 Management-Support Services

The relationship between management and support services is illustrated in Figure 3-4. In this relationship, management's role is substantial in the day-to-day operation of each service.

The primary laboratory support groups are Client Services, Sales and Marketing, and LIMS system support. These groups report directly to the Laboratory President for all aspects of their daily activities.

Secondary relationships are maintained with the Laboratory Administrative Assistant, Laboratory Receptionist, Accounting, and the Human Resources Department. Some groups within this secondary category maintain relationships not only with the Laboratory President, but also with other management groups within the TriMatrix organization.

3.4.3 Management-Quality System

The relationship between management and the laboratory quality system is illustrated in Figure 3-5. In this relationship, management plays a secondary role in the overall scheme. This secondary role provides the quality assurance manager with guidance, company perspective, and structured support in the development, implementation, and maintenance of quality system programs and activities.

This relationship is vital to the success of TriMatrix Laboratories. Without a cost-effective quality system, the overall caliber of laboratory data and the success of all laboratory operations would be jeopardized.

A relationship also exists between management, the quality system, the laboratory support, and the HR staff. This relationship includes but is not limited to: laboratory management directives, and human resources/personnel activities. These activities are implemented and maintained without disruption to the quality system, and are depicted via the dashed lines on Figure 3-5.

3.5 JOB DESCRIPTIONS

The strength of a laboratory lies in the experience and dedication of its employees. TriMatrix hires quality personnel based both on attitude and past job experience. Job descriptions have been written to define the employee qualifications required for each position.

3.5.1 Management Staff Members

Managerial positions are responsible for the development of their respective employees. These positions have specific minimum requirements for years of experience.

3.5.1.1 Laboratory President

Job Description

The Laboratory President (LP) directs the laboratory. Responsibilities include data quality improvements, overall productivity, staff development, safety/training programs, and overall profitability. This position has profit/loss accountability. Budgets are developed annually with senior management. The LP is also directly involved in business development/sales activities, and the sales staff reports directly to him.

Background/Educational Requirements

The LP possesses minimally a bachelor's degree in science, preferably chemistry. The LP has a minimum of 10 years direct work experience in the environmental testing industry. This work experience includes having conducted environmental analyses and several years of demonstrated supervisory experience.

Duties and Responsibilities

1. Development and fulfillment of budgets.
2. Management of total laboratory productivity and quality.
3. Management of proposal preparation.
4. Development of new business and maintenance of client relationships.

5. Development of laboratory organization, leadership, and management planning.
6. Working with the Human Resources department to develop staff members and their career paths.

3.5.1.2 Quality Assurance Manager

Job Description

The Quality Assurance (QA) Manager is responsible for the development, implementation, improvement, and maintenance of all quality systems at TriMatrix. The QA Manager monitors all the analytical methods and procedures performed by the laboratory, and assures compliance with regulatory agency requirements.

Background/Educational Requirements

The QA Manager possesses a B.S. in science, preferably chemistry, and suitable work experience. Work experience must include several years of analytical work and a demonstrated ability to work with and train staff members. A strong working knowledge of quality assurance and statistical quality control procedures, specifically as they apply to analytical protocols, is required.

Duties and Responsibilities

1. Development and implementation of systems to measure and monitor laboratory data quality.
2. Maintenance of the documentation system for generation, control, and archiving laboratory forms, SOPs, and protocols.
3. Approving SOPs and monitoring their compliance with regulatory agency requirements.
4. Maintaining and updating the laboratory Quality Assurance Manual.
5. On-going investigation for optimizing procedures to minimize out-of-control data.
6. Maintenance of national, federal, state, and industrial certifications and accreditations as required.

7. Monitoring internal quality programs within the laboratory and reporting their status to management.
8. Training, training documentation, and evaluation of the effectiveness of training for all staff members in all aspects of the laboratory quality system.
9. Ensuring communication takes place at all levels within the laboratory regarding the effectiveness of the quality system.
10. Perform other duties as deemed necessary by management.

3.5.1.3 Technical Director

Job Description

The Technical Director (TD) is responsible for the development and improvement of technical operations within the laboratory division. The TD oversees the investigation of all new instruments and equipment, method development, and general technical advancement of the laboratory. The TD is also responsible for informing the Deputy TD of current and pending projects and activities.

Background/Educational Requirements

The TD possesses a B.S. in science, preferably chemistry, and suitable work experience. Such work experience includes several years of analytical work and a demonstrated ability to work with and train staff members. A strong working knowledge of instruments and methodologies, specifically as they apply to analytical protocols, is required.

Duties and Responsibilities

1. On-going technical development of the TriMatrix Laboratory pertaining to current and future analytical practices.
2. Overseeing the technical development of TriMatrix staff in the areas of method comprehension and implementation.
3. Development of new analytical procedures within the laboratory.

4. Providing technical advice regarding all equipment and apparatus procurement, and acquisitions.
5. Performing technical review of all Quality Assurance Project Plans (QAPPs).
6. Perform other duties as deemed necessary by management.

3.5.1.4 Laboratory Computer Systems Administrator

Job Description

Provide technical review, guidance, and training in current and future laboratory computer applications.

Background/Educational Requirements

Requires a degree in computer sciences with an emphasis in a chemistry or general science curriculum.

Duties and Responsibilities

1. Developing a complete understanding of the Laboratory Information Management System (LIMS).
2. Reviewing laboratory computer applications and processes, including instrument computer interfaces, data transmission/archiving processes and document control.
3. Providing database maintenance support activities for the LIMS system.
4. Providing technical direction and orchestrating implementation of electronic storage systems for the laboratory.
5. Providing technical training of the laboratory staff in software applications and basic computer operational activities.
6. Perform other duties as deemed necessary by management.

3.5.2 Technical Staff Members

Technical staff members are classified into chemist or technician levels dependant on job type, education, and years of experience. Level Classifications are Chemist I-V and Senior Chemist, Project Chemist I-V and

Senior Project Chemist, Technician I-V and Senior Technician. In addition, qualified candidates are also eligible for group leader status. Classification descriptions are provided in Appendix A. Differences between the levels are printed in bold italicized text. The various classifications are also used by the employee and by management for career path development at TriMatrix.

3.6 MANAGEMENT RESUMES

Laboratory President

Quality Assurance Manager

Human Resources Manager

DOUGLAS E. KRISCUNAS **Laboratory President**

EDUCATION

B.S., Environmental Sciences, Grand Valley State University, 1976

PROFESSIONAL SUMMARY

Mr. Kriscunas is responsible for the accuracy and integrity of all analytical data finalized at this location. He is continuously available for client support to resolve analytical issues as they pertain to environmental problems.

PROFESSIONAL EXPERIENCE

- **Detroit, Michigan**. Laboratory Supervisor for a field laboratory established at the Detroit Wastewater Treatment Plant. The project involved a one-year pilot study of the overall operation and plant performance to upgrade and modify existing treatment processes to meet current and future discharge limits. Approximately 20,000 samples were analyzed by seven full-time analysts.

- **Edmore, Michigan. Hitachi Magnetics Corporation.** Participated in the development and implementation of an on-site, flow-through bioassay of the plant discharge. The study was performed in conjunction with the Michigan Department of Natural Resources, Water Quality Division.

- **Grand Rapids, Michigan. EDI Laboratory Certification.** Direct responsibility for the inorganic parameters analysis and quality control measures necessary for laboratory certification under the Safe Drinking Water Act (SDWA) of 1974. Certification involved both analysis of unknown control samples and corresponding on-site evaluation by the U.S. EPA Region V laboratory certification team.

- **Muskegon, Michigan. Uniroyal Chemical Company.** Participated in the soil survey and on-site evaluation of potential soil contamination from deposited chemical waste materials produced by a major chemical company. On-site sample analyses for select parameters were made to locate and detail the extent of contamination.

- **Edmore, Michigan. Hitachi Magnetics Corporation.** Participated in the implementation of a treatability study to effectively remove cobalt and samarium from

industrial waste. The study results led to the design and installation of treatment facilities.

- **Columbia, Missouri. A.B. Chance Corporation**. Responsible for implementing a treatment study for effective removal of heavy metals from process wastewater in order to achieve acceptable discharge limits.

- **Kent County, Michigan. Mill Creek Watershed Management Project**. Participated in the collection, mapping, and interpretation of environmental characteristics to be used as prototype guidelines for the management of area wide streams in the Great Lakes Basin. The project was funded by the Environmental Protection Agency.

- **Three Rivers, Michigan. Hydramatic Division, General Motors Corporation.** Responsible for the analytical services conducted on a survey of process wastewater for an automotive transmission manufacturer. The project involved data collection and analytical services including grab samples, setting automatic samplers on an hourly basis for a seven-day period, and installing recording meters for continuous pH monitoring.

- **Grand Rapids, Michigan. Michigan Department of Public Health Laboratory Certification.** Supervised analytical, bacteriological, and quality control activities involved in achieving certification status for the analysis of potable water supplies in Michigan.

- **Higgins Lake, Michigan. Ralph MacMullan Conference Center**. Served on a three-member panel before a meeting of the Northern Michigan Environmental Health Association. The topic of discussion was an overview of organic chemicals now found in much of Michigan's ground waters. A representative from industry and the MDPH laboratory completed the panel.

- **Grand Rapids, Michigan. Haviland Chemical Company.** Coordinated a static bioassay performed on a water-based detergent utilizing fathead minnows in the 96-hour static test.

- **Sparta, Michigan**. Conducted a dendrological survey of a proposed oil drilling site. The survey was incorporated in an overall environmental assessment of the proposed drilling site.

- **Caledonia, Michigan**. Conducted a dendrological survey of riparian vegetation types located along the banks of the Thornapple River in the area of the Labarge Dam.

- **Grand Haven, Michigan**. Conducted a limnological investigation of the estuary waters of the Grand River watershed near Grand Haven. The collected limnological data were evaluated for potential eutrophication problems resulting from nutrient discharges upstream.

- **Kalamazoo, Michigan. American Cyanamid Company**. Supervised laboratory work required in assisting a major chemical manufacturer with a permit application for existing facility hazardous waste management operation to administratively complete four supplemental technical attachments, multidisciplinary services were required in the areas of hydrogeologic investigation, environmental assessment, failure mode assessment, and engineering review. Field work was completed in 19 days with a report to the client in 25 days to meet scheduled deadlines.

- **Kent County, Michigan**. Coordination of field and laboratory services in conjunction with Act 641 monitoring requirements at two county-owned and operated refuse sites. Specialized studies were also conducted to identify possible use of landfill gases for electric power generation and the source identification of volatile organic contaminants typical of most municipal landfills.

- **Cascade Township, Michigan. Cascade Resource Recovery/Waste Management, Inc.** Implementation of two separate tracer studies aimed at pinpointing possible cracks or defects in the clay liners of four hazardous waste disposal trenches. The study utilized a low absorptivity fluoroscene water soluble dye introduced to each trench. Samples collected from each liner failure detection system were then analyzed for the fluorescent characteristics of the dye.

- **Cascade Township, Michigan. Cascade Resource Recovery/Waste Management, Inc.** Coordination of field and laboratory services in connection with Michigan

Department of Natural Resources Act 64 and U.S. EPA RCRA monitoring requirements. Each sampling event involves collection of ground waters, surface waters, and leak detection monitoring sites.

- **Cascade Township, Michigan. Cascade Resource Recovery/Chemical Waste Management, Inc.** Acted as project chemist and field services coordinator for activities involved in the excavation and site decontamination of an Act 64/RCRA hazardous waste disposal facility. The decontamination program involved the analysis of soils collected in and around each disposal trench after the removal of approximately 20,000 cubic yards of waste materials.

- **Cincinnati, Ohio. Rumpke Waste Systems, Inc.** Acting project manager for a large waste disposal firm headquartered in Ohio, with 20+ landfills located in a 5 state geographical area. Mr. Kriscunas is responsible for coordination of laboratory activities in conjunction with all ground water, surface water, and NPDES monitoring requirements.

RICK D. WILBURN **Quality Assurance Manager**

EDUCATION

B.S., Environmental Studies, Earlham College, 1985

PROFESSIONAL SUMMARY

Mr. Wilburn is responsible for all aspects of the laboratory Quality Control/Quality Assurance Program. Primary responsibilities include conducting internal and external auditing of the laboratory, procurement and maintenance of state and federal certifications, and ensuring that all facets of the quality control program remain at the highest level possible. Mr. Wilburn also manages the external and internal Quality Control check sample programs.

PROFESSIONAL EXPERIENCE

- **TRACE Analytical Laboratories, Inc. – Quality Assurance Manager, 12/95 – 10/96.** Responsible for designing, implementing, and monitoring a formal quality control program. The program included: conducting internal and hosting external audits, implementing corrective actions resulting from any deficiencies, scheduling and reporting performance evaluation sample results, and the review of all Level 5 data packages.

- **EARTH TECH – Organic Laboratory Manager, 10/95 – 12/95.** As Organic Laboratory Manager, Mr. Wilburn was responsible for the day-to-day operations of the organic laboratory, including volatile and semi-volatile analyses by gas chromatography and gas chromatography/mass spectrometry. His responsibilities included scheduling, instrument maintenance, the writing and implementation of standard operating procedures, quality assurance, analytical data review, the technical development of all the organic laboratory personnel, and project management. Mr. Wilburn was also responsible for research and development in the organic laboratory, focusing on ways to automate and improve sample analysis, data quality, and turnaround time.

- **EARTH TECH (Formerly WW Engineering & Science) – Semi-Volatile Laboratory Supervisor, 1/94 – 10/95.** Responsible for the daily operation of the semi-volatile laboratory. The semi-volatile laboratory utilizes gas chromatography, gas chromatography/mass spectrometry, and high performance liquid chromatography in the analysis of semi-volatile organic compounds.

- **WW Engineering & Science – Supervisor, Organic Extraction Laboratory, 4/93 – 1/94.** Supervisor of the staff of chemists responsible for all organic extractions. Accountable for the processing, quality, and turn around of a wide variety of samples involving many extraction techniques and methodologies. Continually experimenting with automation and new technologies to improve extraction quality and turn around time, including solid phase and supercritical fluid extractions.

- **WW Engineering & Science – Supervisor, Mass Spectrometry Laboratory, 9/89 – 1/94.** Supervisor of the staff of chemists analyzing samples for semi-volatile organics in the mass spectrometry laboratory. Oversee all analysis and daily activities involved with the mass spectrometry laboratory. Evaluate, recommend, and implement new technologies. Implementations of these include sub-ambient injections using a Varian SPI injector, sub-ambient temperature programs for optimized chromatography, and the use of ion trap mass spectrometers for lower operating detection limits

- **IT Corporation, (formerly PEI Associates, Inc.) – Chemist, Level 3, GC/MS Semi-Volatile Team Leader, 7/88 – 9/89.** Along with daily analysis of samples, responsible for coordinating the efforts of the three analysts and three instruments used for semi-volatile analysis. This included scheduling each instrument/analyst to make sure analyses were completed correctly and on time, training new personnel, instrument maintenance, data checking, and reporting project results to management for client distribution. Leader of GC/MS Quality Circle group.

- **PEI Associates, Inc. – Chemist, Level 2, GC/MS Analyst, 12/86 – 7/88.** Primary responsibilities included analyzing soil, water, and other media with an Extrel ELQ-400 mass spectrometer system. Analyses performed included semi-volatile and volatile organics listed on the EPA's Toxic Compounds List according to the Contract Laboratory Program protocol. Also analyzed various other non - Toxic Compounds List compounds using appropriate methods.

- **PEI Associates, Inc. – Chemist, Level 1, GC Analyst, 7/85 – 12/86.** Carried out a variety of organic analyses in a wide range of matrixes. Was a primary analyst conducting CLP testing for pesticides and PCBs, and was the primary analyst for routine and non-routine testing for herbicides, and volatile organics.

STACY K. VANDEN AKKER **Human Resources/Business Manager**

EDUCATION

B.S. Business Management, Davenport Business College, 1996.

PROFESSIONAL SUMMARY

As Business Manager, Ms. Vanden Akker is responsible for the record keeping and review of all financial data for the company. She manages accounts payable, accounts receivable, cash flow, and the generation of financial statements and other management reports. She maintains accurate records for potential audit or other review.

Ms. Vanden Akker also manages all Human Resource functions for TriMatrix Laboratories. She processes payroll on a biweekly basis, coordinates employee benefits, handles internal employee questions and concerns, assures compliance with all federal, state, and local employment laws and regulations, and maintains complete and accurate personnel data files.

PROFESSIONAL EXPERIENCE

- **EARTH TECH – Environmental Laboratory Business Office, Administrative Assistant, 9/95 – 1/97.** Responsible for assisting the Business Office Manager with accounts receivable, accounts payable, and the daily input of purchases and invoices.

- **EARTH TECH – Lowell Wastewater Treatment Plant Operator/Laboratory Technician, 8/93 – Present.** Responsible for sample collection, equipment maintenance, and the daily laboratory analysis of suspended solids, CBOD, ammonia, zinc, fecal coliform, pH, residual chlorine, and phosphates. She is also responsible for the correct input of all results into the reports required by the State of Michigan Department of Environmental Quality.

- **EARTH TECH – Lowell Wastewater Treatment Plant Assistant Laboratory Technician, 8/90 – 8/93.** Assisted the Laboratory Technician in the laboratory analysis of suspended solids, CBOD, ammonia, zinc, fecal coliform, pH, residual chlorine, and phosphates.

3.7 APPROVED SIGNATORIES

Designated laboratory staff members have the responsibility of validating laboratory documents on behalf of the laboratory organization. General categories and documents requiring a valid signature are presented below.

3.7.1 Client/Invoice Reports

All laboratory reports compiled and mailed contain at least one representative signature validating the contents of the laboratory report. By default, a report is signed by the appropriate project chemist. Alternate and/or additional signatures include the Laboratory President, Technical Director, and Quality Assurance Manager. No other individuals are approved to perform signatory approval of client/invoice reports.

3.7.2 Proposals, Price Quotations, and Laboratory Contracts

Proposals or price quotations for laboratory services contain at least one representative signature, validating the pricing, terms, and conditions of the quotation. At least one representative signature is required. Approved signatures for proposals and price quotations include the Laboratory President, project chemists, and a sales or marketing representative.

Required signatures for laboratory contracts are the Laboratory President and a Sales or Marketing representative.

3.7.3 Quality Assurance Project Plans (QAPP)

Quality Assurance Project Plans contain representative signatures of several responsible parties outside the laboratory. The only laboratory signature generally found on a QAPP is that of the QA Manager. The QA Manager has designated QA/QC responsibilities that are fully documented in QAPP documents. All QAPPs are signed prior to submission to a governing body or client.

Signatures on the QAPP ensure all procedures, materials, quality control practices and project reports meet the predefined goals of the plan.

3.7.4 Purchase Orders and Agreements

Because the laboratory spends a significant portion of its annual budget on supplies and equipment, guidelines have been established to document and control purchasing.

Purchasing of general supplies is handled through a contracted vendor within the budgetary guidelines established for each laboratory area.

For major purchases such as equipment, service assessments, or building renovations in excess of $500.00, purchase orders or agreements must be approved by the Laboratory President or CEO.

3.7.5 Binding Statements - Laboratory Certification Documents or Accreditation

Many certification or accreditation programs require the laboratory to provide items and statements regarding details on the laboratory's operations and staff. In some cases these statements must be presented to the certifying body accompanied by a binding signature of the Laboratory President or CEO.

3.8 CAPABILITIES, CERTIFICATIONS, ACCREDITATIONS, AND PROFICIENCY TESTING PROGRAMS

3.8.1 Capabilities

TriMatrix conducts analytical laboratory services in support of all major environmental regulations, including CERCLA, RCRA, CWA, CAA, and TSCA.

The laboratory is capable of routinely analyzing a variety of sample matrices, including drinking water, surface water, wastewater, soil, groundwater, solid waste(s), and sludge(s). In addition, analyses have been performed on fish tissue, biota, and air samples by project request.

TriMatrix routinely performs a wide array of environmental and non-environmental, chemical and physical analyses. A list of methods currently utilized by TriMatrix is provided in Appendix B. To maintain a quality system of analytical protocols, TriMatrix uses written Standard Operating Procedures (SOPs) derived from methodology specified by the United States

Environmental Protection Agency, other federal and state agencies, and professional compendia.

When requested by the client, samples for analyses outside the analytical scope of TriMatrix can be subcontracted to another laboratory. Unless otherwise specified or required by the client, samples will be subcontracted to a NELAP accredited or ISO-17025 certified laboratory.

3.8.2 Laboratory Certification - Federal, State, and Independent

TriMatrix has been formally recognized for its commitment to quality. The laboratory maintains certification through various federal agencies, as well as several state regulatory agencies and private entities. As required by most of the programs, including NELAP and ANSI-ASQ, certification and accreditation claims must be made in such a manner as to not imply certification or accreditation beyond that given on the laboratory's actual scope of accreditation. Generic certification or accreditation claims must not be made. Accreditations are analyte/analyses specific. Any analyte tested or analysis performed without corresponding NELAC accreditation is flagged as such in the Statement of Data Qualifications section of the report. The use of symbols and other forms of accreditation must always be analyte and/or method specific. Certification programs in which TriMatrix currently participates are listed in the subsections below:

3.8.2.1 Federal Certification/Approval Programs

- NELAP – National Environmental Laboratory Accreditation Program
- Department of Defense - ELAP

3.8.2.2 State Certification Programs

Arkansas	Department of Environmental Quality
Florida	Department of Health
Georgia	Environmental Protection Division
Illinois	Environmental Protection Agency
Kansas	Department of Health and Environment
Kentucky	Department for Environmental Protection

Louisiana	Department of Environmental Quality
Michigan	Department of Natural Resources and Environment
Minnesota	Department of Health
New York	Department of Health
North Carolina	Department of the Environment and Natural Resources
Texas	Commission on Environmental Quality
Virginia	Division of Consolidated Laboratory Services
Wisconsin	Department of Natural Resources

3.8.2.3 Independent Certification Programs

ISO/IEC 17025

3.8.3 Proficiency Testing Studies

An integral part of most certification programs are the participation in Proficiency Testing (PT) Studies. PT studies are third party prepared "blind" or "double blind" spiked samples that contain specific (known only to the administrators of the study) concentrations of target analytes. The laboratory analyzes the samples and reports the results to the agency or firm administering the PT study. The results are evaluated and the laboratory's performance graded based on a comparison of the reported values with the known analyte concentrations. A report is prepared and submitted to the laboratory, certifying programs, and agencies or private entities that subscribe to the program.

TriMatrix routinely participates in the following proficiency testing programs:

- Water Supply (WS) Study
- Water Pollution (WP) Study
- Soil PT Study
- USEPA DMRQA

3.9 LABORATORY FACILITIES, EQUIPMENT, AND SUPPLIES

3.9.1 Physical Plant

3.9.1.1 Laboratory Demographics

The TriMatrix Laboratories facility, located at 5560 Corporate Exchange Court SE, Grand Rapids, Michigan, was constructed in 1999. The 20,000 square foot structure was designed predominantly by the laboratory staff, with careful consideration given to the strict analytical testing requirements of today's environmental marketplace. Special attention was given to the sample preparation areas and the segregation of non-compatible areas such as semi-volatile and volatile organics. Samples are stored according to type, with a large centrally located walk-in cooler used for the storage of all non-volatile, non-hazardous waste samples, to which both the sample receiving personnel and the laboratory staff have ready access. Quiet office areas were incorporated into the building design to provide space for data review, report compilation, and technical review discussions. A breakdown of each general area of analysis and the space allocated is as follows:

Laboratory Area	Space Allotted, ft^2
Wet Chemistry/Microbiology	Approx. 2000
Atomic Absorption/Emission	Approx. 2000
Volatile Organics	Approx. 1600
Semi-Volatile Organics	Approx. 2300
Sample Processing & Storage	Approx. 2400
Administrative Offices	Approx. 4200
Organic Pretreatment	Approx. 1300
Miscellaneous Space	Approx. 4200

The attached facility layout (Figure 3-6) shows the general lab areas and other space allocations.

Access to all laboratory areas including sample storage, sample container preparation, sample preparation, sample disposal, documents storage and clients files are secured. Non-authorized personnel may enter these areas only if escorted by a laboratory staff member.

Project initiation, sample control, and analysis, are all controlled using a Laboratory Information Management System (LIMS).

Under the direction of the Laboratory President, TriMatrix is organized into the following operating areas and support services.

Laboratory Administration

Client Services
Data Management
Sales/Marketing
Project Management
Health and Safety
Quality Assurance
Computer Services

Analytical Operations

Inorganic Laboratory
- Wet Chemistry Laboratory
- Metals Laboratory
- Metals Preparation Laboratory

Organic Laboratory
- Volatile Organic Laboratory
- Semi-Volatile Organic Laboratory
- Semi-Volatile Organic Preparation Laboratory

(Refer to Figure 3-2 for a graphical representation of the Laboratory Organization Chart)

3.9.1.2 Reagent Water Systems

Laboratory water originates from the Grand Rapids potable water distribution system. At the laboratory, the water is softened and filtered through activated carbon to remove residual chlorine. The water then enters a reverse osmosis system where approximately 90% of the dissolved constituents are removed. The water is temporarily stored in a 120 gallon holding tank until demand activates a mechanical pump that transfers the water through two mixed bed deionizing canisters. The water now meets the requirements of ASTM Type II. Depending on procedural requirements this water can be used as is, or treated further. Further treatment is accomplished at TriMatrix via distillation or the use of a Milli-Q Advantage A-10 Water Purification System.

Each water system is monitored for specific quality requirements. The water is tested daily for total organic carbon and resistivity, weekly for pH, hardness, total residual chlorine and conductivity, and monthly for heterotrophic plate count.

Responsibility for monitoring the TriMatrix reagent water systems is carried out by the Quality Assurance Department and personnel in the inorganic laboratory.

3.9.1.3 Ventilation Systems

The laboratory ventilation system was specifically designed to minimize or eliminate airborne contamination. Externally, the air conditioning unit intakes were located taking into consideration prevailing wind patterns, positioning them upwind of the fume hood exhaust stacks. Taking into account wind-shifts, the exhaust stacks were equipped with high velocity fans to disperse potential contaminants well above the building. Internally, the air-handling systems controlling heating, cooling, and humidity, also maintain maximum cfm air turnover. Additionally, the air-handling systems are monitored and controlled via a NOVAR computer controller.

3.9.1.4 Compressed Air

Compressed air must be free of dirt, water, and oil. Compressed air purchased from vendors is high purity grade (breathing air). Compressed air produced in the laboratory uses filters at the compressor to remove water from the delivery lines. For the gas chromatographs and atomic absorption spectrophotometers, additional filters are located on each instrument to remove any residual oil at the point of use.

3.9.1.5 Electrical Services

The electrical system in use at TriMatrix was designed specifically for a laboratory environment. Special attention was paid to instrument requirements, including the isolation of separate lines for critical applications like GC, GC/MS, atomic absorption, and automated analyzers.

All laboratory benches, hoods, and work areas were designed with sufficient outlets to accommodate a variety of laboratory applications, such as distillations, digestions, and extractions.

Surge protection devices are in place for all laboratory computing equipment. The laboratory LIMS system is also protected by an Uninterrupted Power Supply (UPS). This UPS allows for a sequenced shutdown of the LIMS system during a power failure.

3.9.2 Equipment, Supplies, and Chemical Procurement; Reception, Storage, and Inventory

For an environmental testing laboratory where trace analyses are routinely performed, certain specifications for laboratory equipment, supplies, and chemicals are critical to quality. A minimum specification for accuracy and precision is required for the purchase of equipment and supplies. The Technical Director, in conjunction with the Laboratory President and laboratory area managers, are responsible for determining minimum specifications and approving purchases. Approval is documented on the purchasing department's order sheets (Appendix C). Purchasing is coordinated through the purchasing department. Records are also maintained on all vendors

exhibiting poor performance on either their service or product (Appendix D). Relationships will be terminated with any vendor whose records indicate sub-standard performance.

3.9.2.1 Equipment Management/Maintenance/Inventory

Adequacy of equipment for its intended purpose must be verified before use. A sufficient inventory of equipment is available to prevent testing delays resulting from equipment failure. A stock supply of common spare parts is also maintained.

Service is performed on equipment on a scheduled basis. Maintenance logbooks are kept to document maintenance procedures on major equipment, allowing preventive maintenance frequency and requirements to be determined. Maintenance procedures are discussed in the various analytical SOPs.

A complete listing of Laboratory Equipment is presented in Appendix E of this manual.

3.9.2.2 Glassware

Only glassware providing the required precision is used for a particular analytical procedure. TriMatrix purchases Class A pipets, burettes, and volumetric flasks, to meet this specification. A standard operating procedure is utilized for cleaning each type of glassware. Cleaning of glassware is performed according to the analysis being conducted and the sample matrix involved, but certain general rules apply to all glassware washing procedures:

- Use hot water to wash away water-soluble substances.
- Use detergent, dichromate solution, organic solvent, nitric acid, or aqua regia to remove other materials according to the specific glassware cleaning procedures.
- Avoid using detergents on glassware to be used for phosphate determinations.

- Use ammonia-free water for ammonia and kjeldahl nitrogen analyses.
- Do not oven dry volumetric glassware over 90° C.

For all analyses, it is advisable to rinse glassware with tap water followed by deionized water immediately after use, as residue allowed to dry on glassware is more difficult to remove.

3.9.2.3 Reagents, Solvents, and Gases

Reagents, solvents, and gases are available from vendors in a broad range of purity, from technical to ultra pure grades. The analysis, as well as the sensitivity and specificity of the method, must be considered when choosing a grade. Analytical reagent (AR) grade is suitable for most inorganic analyses. Trace organic analyses frequently require ultra pure grades. AR grade is the minimum approved for reagents used in organic analysis. The absence of certain impurities is required for some GC detectors - notably sulfur and phosphorus in an FID detector. Trace metals analyses including atomic emission and atomic absorption spectroscopy usually requires spectro-quality reagents, although AR grade may be suitable in some cases. Florisil, silica gel, and alumina used as absorbents in organic extract cleanups must be checked for interfering components and activated according to the analytical method.

Compressed gases are available in various purities, usually expressed as a percent (e.g. 99.999). Gases are filtered in the laboratory delivery lines to remove moisture, oil, and other contaminants. Refer to the analytical method and instrument manufacturers operating manual for gas purity requirements.

Purchasing of reagents, solvents, and gases are carefully controlled through an ordering system that maintains a minimum level of quality in the testing process. Upon receipt Certificates of

Analysis are forwarded to the Quality Assurance department where they are scanned and stored. Each laboratory area will monitor the proper storage and the eventual removal of reagents, solvents, and gases, when their shelf life has expired. All consumable reagents and chemicals must be labeled with the date received to ensure a First-In-First-Out (FIFO) system of use.

Provided they are available, expiration dates of unopened chemicals are based on the date specified by the manufacturer. They may also be derived from the analytical method. The following guidelines are utilized in assigning expiration dates.

Order	Bulk Chemicals[1]	Purchased Stock Solutions[2]	Laboratory Prepared Stock Solutions[1, 3]	Laboratory Prepared Working Solutions[1, 3]
Primary	Manufacturer	Manufacturer	Method	Method
Secondary	5-Years	1-Year	1-Year	6-Months
Tertiary	Method	Method		
Note 1	The expiration date of bulk chemicals and prepared solutions must be re-evaluated when the chemical or solution amount/volume has reached 1/3 of the original amount/volume based on frequency of use and evidence of degradation and/or contamination.			
Note 2	Ampules of purchased stock solutions designed for a single use expire upon opening and may not be stored for more than immediate use.			
Note 3	The expiration date of laboratory prepared solutions may not exceed the expiration date of any chemical, standard, or reagent used in the preparation.			
Note 4	Ethers have an expiration date of 45 days after opening due to the potential for peroxide formation. Peroxide checking is performed after opening.			

3.9.2.4 Certified Standards

The purity and traceability of standards used in the analytical process is crucial to the quality of the data generated. Only high quality standards certified by established vendors are to be utilized. Calibration standards must be of the purity required by the method for a particular analysis. All purchased standards are entered into the LIMS system and labeled with a unique identifier and an expiration date. Stock and working standards are likewise labeled.

All calibration standards are validated against a second source standard. A second source standard is analyzed with every initial calibration. The quantitated value is compared to laboratory

established limits. Recovery must fall within these limits for the calibration and calibration standard to be considered acceptable. Stock and working standards are also monitored for visible signs of deterioration (precipitates, color change, volume change).

3.9.2.5 Chemical / Reagent Storage

Bulk chemicals and reagents are stored in a several locations and under a wide variety of conditions within the laboratory. Specific storage conditions for many reagents are presented in each laboratory testing SOP. Additional storage information is referenced in both the TriMatrix Laboratory Safety Manual and the TriMatrix Chemical Hygiene Plan. For general purposes, the following storage conditions are used:

Chemical /Reagent Type	General Storage Requirements	Location/Lab Area
1) Bulk Dry Chemicals	Dry Chemical Storage Cabinets	Inorganic Laboratory
2) Inorganic Acids	Vented Acid Storage Cabinets	Metals Laboratory
3) Organic Solvents-Flammable	Vented Flammable Cabinets	Inorganic & Prep Laboratory
4) Organic Solvents-Nonflammable	Vented Storage Cabinets	Inorganic & Prep Laboratory
5) Compressed Gases	Secured Gas Storage Area	Garage & Outside Storage
6) Bacteriological Materials	Reagent Refrigerator	Inorganic Laboratory
7) Aqueous Standards	Reagent Refrigerators	All Laboratory Areas
8) Organic Standards-Flammable	Explosion Proof Refrigerators and Freezers	Organic Laboratory Areas
9) Organic Standards-Nonflammable	Standards Refrigerator & Freezers	Organic Laboratory Areas
10) Sample Extracts	Extract Freezers	Organic Laboratory Areas
11) Digestates-Metals	Vented Acid Storage Cabinets	Metals Laboratory

3.10 TRAINING

Proper training of laboratory personnel is an essential part of staff development. Training procedures include documentation of training activities completed and serve as a guideline for continual staff development. All testing personnel must familiarize themselves with the laboratory's training procedure (TriMatrix SOP GR-10-109) and implement all associated policies and procedures.

Personnel files contain the training documentation related to the development of each laboratory employee. Included are in-house training, external training certificates, safety training, ethics training, and other materials specific to the analyst. The quality assurance department maintains the training file system.

3.10.1 Training Orientation

The human resources department initiates training orientation for each new employee on the first day of employment. Orientation includes completion of various training checklists (Appendix F). These checklists provide documentation of the orientation after being signed by the new analyst and the trainer and become a part of the employee's permanent training record.

3.10.2 Code of Ethics/Data Integrity Training

It is the intent of TriMatrix Laboratories, Inc. to consistently report data of the highest quality. For this to be possible, analysts are instructed in accordance with the level of data quality desired and are provided with an environment conducive to its achievement. Besides providing the analyst with all necessary supplies and equipment, the work environment is maintained as free from undue pressures as possible. Such pressures may be through internal peer pressure or deadlines, or through external customer complaints or priority requests. It is the responsibility of management to insulate the analyst from such pressures as much as possible. Data quality cannot be compromised without reason and the analyst will not be reprimanded for adhering to established quality protocols in the face of such pressures.

During orientation human resources will explain these policies and the employee will be required to review and sign a Code of Ethics/Data Integrity Policy Agreement (Appendix G). This agreement documents the understanding between management and the new employee concerning management's position on data quality, sample analysis and data reporting, and the consequences of improper actions. The signed agreement is retained as part of the employee's permanent record.

3.10.3 Document Storage

All essential laboratory documents are stored on the laboratory's intranet drive designated L:\ Library. During orientation, the new employee is shown how to access these documents and instructed on which ones are required reading. These include the Quality Assurance Manual, Chemical Hygiene Plan, Safety Manual, Employee Handbook, a memo containing instructions on TriMatrix error correction policies, and standard operating procedures. Forms are signed documenting that the employee has read and understood these documents.

3.10.4 Demonstrations of Capability (DoC)

All analysts, and every new instrument used for sample analysis, must complete a successful Initial Demonstration of Capability (IDC) prior to performing any sample analysis. Additionally, all analysts must complete annual Continuing Demonstrations of Capability (CDC). All DoCs are documented, reviewed, and signed in accordance with the TriMatrix SOP for analyst training (GR-10-109). All supporting data necessary to reproduce the DoC is archived and available. Sample analysis may not begin without the successful completion of an appropriate DoC and submission of all associated paperwork to the Quality Assurance Department. All demonstrations of capability begin by requesting the appropriate paperwork from the quality assurance department.

3.10.4.1 Initial Demonstration of Capability (IDC)

After orientation and training each analyst must successfully complete a one time IDC study (an IDC must be repeated whenever a significant procedural change occurs). Conduct the IDC study by preparing four replicate blank spikes (for any procedure with a pre-treatment) or four replicate calibration verifications (for any procedure without a pre-treatment) at a concentration in the lower half of the calibration or analytical range. For analyses where a spiking standard is not an option, the acceptable analysis of a single blind PT sample will suffice. Alternatively, the analyst may analyze four replicates of a client sample against four replicates of the same sample analyzed by an experienced analyst for statistical comparison.

Process the four spikes, PT sample, or replicates, following every step in the preparative and/or analytical procedure concurrently or over a period of no more than 72 hours. Enter all four results into the Appendix H IDC spreadsheet, or all eight replicates into the Appendix I IDC spreadsheet. The spreadsheet will calculate average percent recovery and relative standard deviation then evaluate against default acceptance criteria (which may need changed to fit the procedure). If all acceptance criteria pass, the analysis of actual samples may begin. If the DoC is performed as part of a new instrument validation, the New Instrument Information form (Appendix J) is also required.

When one or more analytes fail any criterion, the study is unacceptable for the failed analyte. Locate and correct the source of the problem then repeat the study for the failing analyte successfully. If none of the options presented above are possible (such as with the TCLP pre-treatment), the analyst must perform and submit an acceptable method blank with acceptance being that all analytes are at or below the detection limit.

When complete, forward the IDC spreadsheet, the NELAC Demonstration of Capability Certification Statement (Appendix K), the Laboratory Training Checklist (Appendix L), the DL study when one was necessary (Appendix M), and/or PT results to the Quality Assurance department for review and training documentation.

3.10.4.2 Continuing Demonstration of Capability (CDC)

Annually a Continuing Demonstration of Capability is required to document continued proficiency in an analysis. The CDC is typically accomplished through the analysis of an acceptable PT sample. Alternatively another IDC study can be performed. The runs used in this IDC can be dedicated spikes, the last four results of a DL study, or four consecutive blank spikes. All analyses must be performed exclusively by the analyst.

When complete, forward a copy of all applicable data necessary to reconstruct and validate the study to the Quality Assurance department for training documentation.

3.10.5 Continuing Training and Education

TriMatrix Laboratories, Inc. is committed to education and training on a continual basis for employees. There are various ways in which continuing education may occur, including:

- seminars
- cross-training for additional job responsibilities
- retraining
- method and technology updates

3.10.6 SOP Revision Checklist

SOPs are periodically reviewed and updated. When an update is released, the appropriate form from Appendix L or N must be completed to record that the applicable analysts have read, understood and agree to follow the revised SOP.

3.11 DETECTION LIMITS

The process of quantifying an analyte in an environmental matrix using specific analytical procedures must use detection limits as a point of reference. The three levels of analytical detection are described below.

3.11.1 Instrument Detection Limit - IDL

Most analytical instruments produce a signal even during a blank analysis. This signal is referred to as the noise level. The IDL is the analyte concentration required to produce a signal greater than three times the standard deviation of the instrument noise level. SW-846 method 6010 requires semi-annual IDLs, and method 6020 requires quarterly IDLs.

The IDL is performed through analysis of reagent blanks. Seven blanks are run each day over three non-consecutive days. Each measurement should be performed as though it were a separate analytical sample followed by a rinse

and/or any other analytical step normally performed between the analyses of separate samples. The IDL is estimated by calculating the average of the standard deviations of the twenty-one runs (if the instrument does not give a signal for the blank, perform the study using standards at the expected IDL concentration).

The IDL only defines an instrument's limitations and does not take into consideration sample processing in preparation for the analysis. As such, it may not be used to estimate the detection limit (Figure 3-7). IDL studies are only performed when specified by the analytical method reference.

3.11.2 Detection Limit - DL

The DL is defined as the minimum concentration of a substance that can be detected and reported with 99 percent confidence (statistically) that the value is above zero. The DL is calculated from spiked blanks which go through the entire sample preparation and analysis scheme. DL studies are run for aqueous and solid methodologies for every analyte targeted. All calculated DL values must be verified.

The DL procedure used at TriMatrix Laboratories follows the guidance specified in 40 Code of Federal Regulations, Part 136, Appendix B, as described in TriMatrix SOP GR-10-125, where seven replicate aliquots of laboratory reagent water (for an aqueous methodology) are spiked with every analyte of interest at the estimated minimum practical quantitation limit (LOQ). For a solid methodology, in lieu of laboratory reagent water an inert substance or empty vessel is spiked.

It is essential that all sample preparative, cleanup, and analytical steps be included in the DL study. Calculate DL study results based on all computations required to achieve the final result in sample-designated units.

To calculate the DL, input all seven results to the DL spreadsheet located on the laboratory intranet library. The spreadsheet calculates the DL by multiplying the standard deviation by 3.143 which is the one-sided t-distribution for seven samples (with six degrees of freedom) for a 99% confidence interval.

There must be no zero percent recoveries in the dataset and the concentration spiked must be between 1 and 5 times the DL value.

When instructed to spike lower by the spreadsheet (as a result of the study failing because it was spiked too high), repeat the study at a lower concentration (down to 5 times lower than the lowest requested reporting limit. Repeat the study at a higher concentration if the spreadsheet flags the DL value as “FAIL”. Re-estimate the actual DL based on the failed DL value before repeating the study.

All DL studies must be verified. The DL verification is accomplished by analysis of a method blank and blank spike. Prepare the blank spike at a concentration between 1 – 4 times the calculated DL value. If the blank spike response is greater than or equal to three times that found in the method blank, the DL verification passes and the calculated DL value is acceptable.

Note: The DL procedure is not complete until a DL verification study has also been performed successfully.

If the blank spike response is less than three times that found in the blank, the DL value is too low. Repeat the DL study by estimating the concentration necessary to produce a response equal to or greater than three times the method blank and repeat the verification study. Repeat the DL verification. Repeat until the DL verification is at least three times the method blank. Only the DL value or DL verification that passes the DL verification criterion may be used as the calculated DL.

Once established the DL for all analytes in aqueous and solid methodologies must be verified quarterly, and re-established whenever the verification fails or significant modification is made to the procedure.

Appendix M shows an example of the DL spreadsheet used to calculate and verify DL values and practical quantitation limits.

3.11.3 Limit of Quantitation - LOQ

The LOQ is defined as the minimum concentration of an analyte that can be quantitatively reported (versus qualitatively detected) within specified precision and accuracy limits under normal laboratory operating conditions. (Figure 3-7). The minimum LOQ is the concentration spiked in an acceptable DL study. The minimum LOQ should be at least 3 times the DL.

Once established the LOQ for all analytes in aqueous and solid methodologies must be verified quarterly, or re-established whenever the verification fails or significant modification is made to the procedure.

Note: Quantitation limits actually achieved for any given sample analysis will be highly dependent on the matrix and/or required dilutions.

3.12 PROCEDURES FOR ACCEPTING NEW WORK/TESTS

3.12.1 New Test Requests, Development, and Approval

Client Services must submit a request for new analyses to each impacted laboratory area where the request will be formally processed. Evaluation of the request will include the suitability of the analyte for quantitation, availability of existing test methods, instrumentation, capacity, standard materials, etc. The Technical Director and/or Group Leader will provide a prompt response to client services to ensure client needs can be addressed.

All newly developed procedures are reviewed by the laboratory Technical Director and must comply with all requirements outlined in section 3.10.4.

Figure 3-1

Quality Control Chain of Command Flow Chart

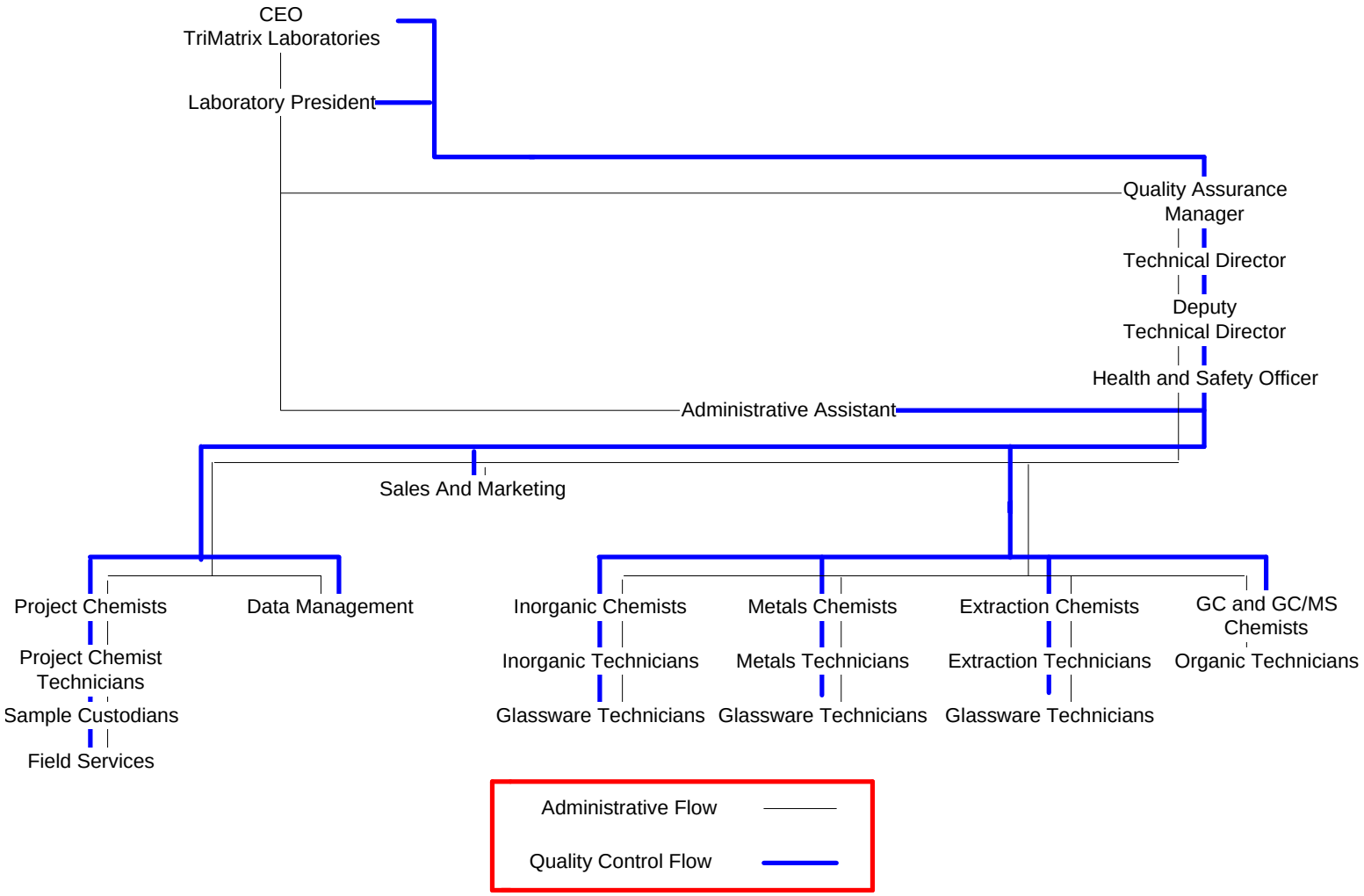


Figure 3-2

Organizational Chart

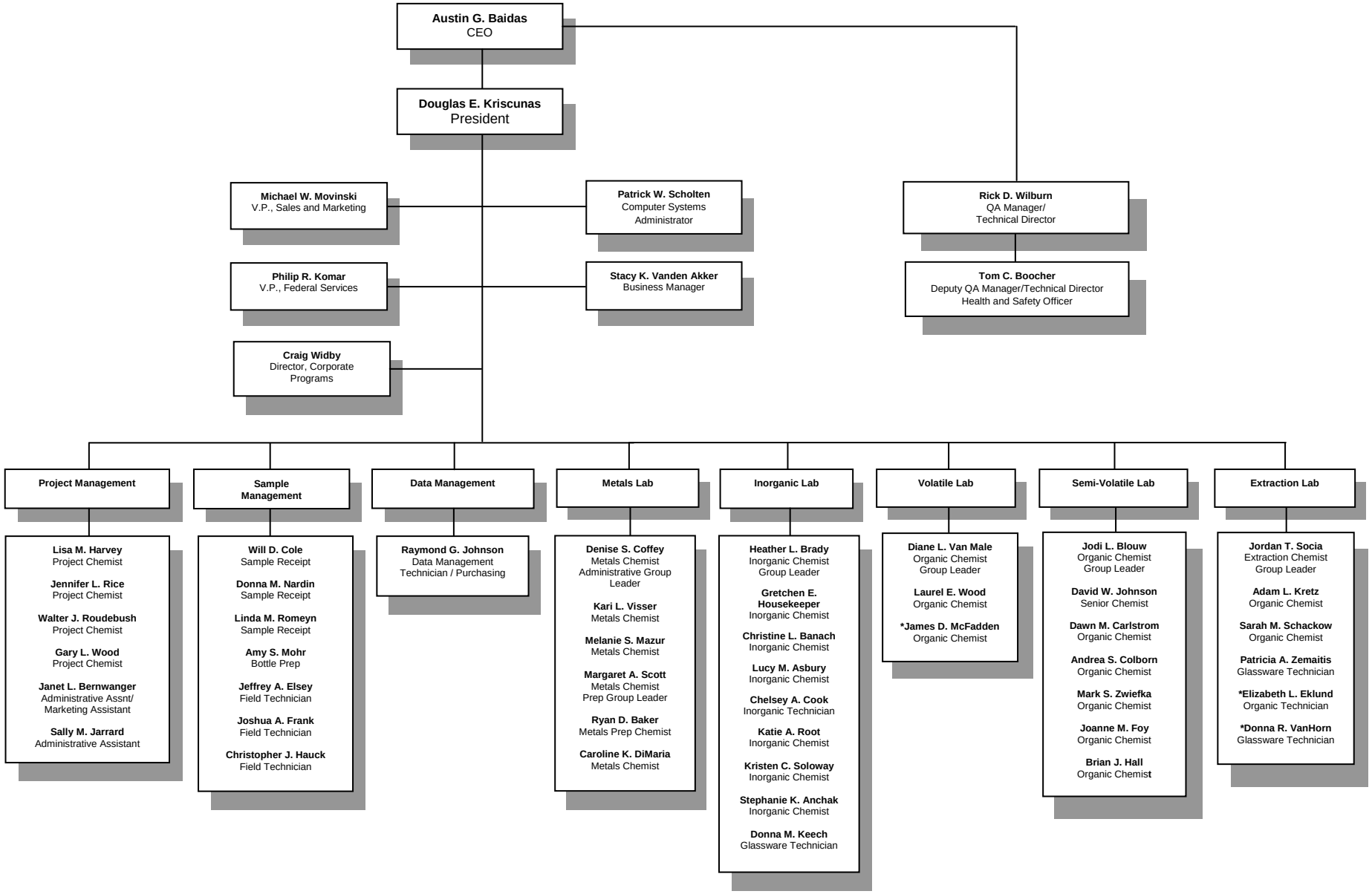


Figure 3-3

RELATIONSHIPS

Management to Technical Services

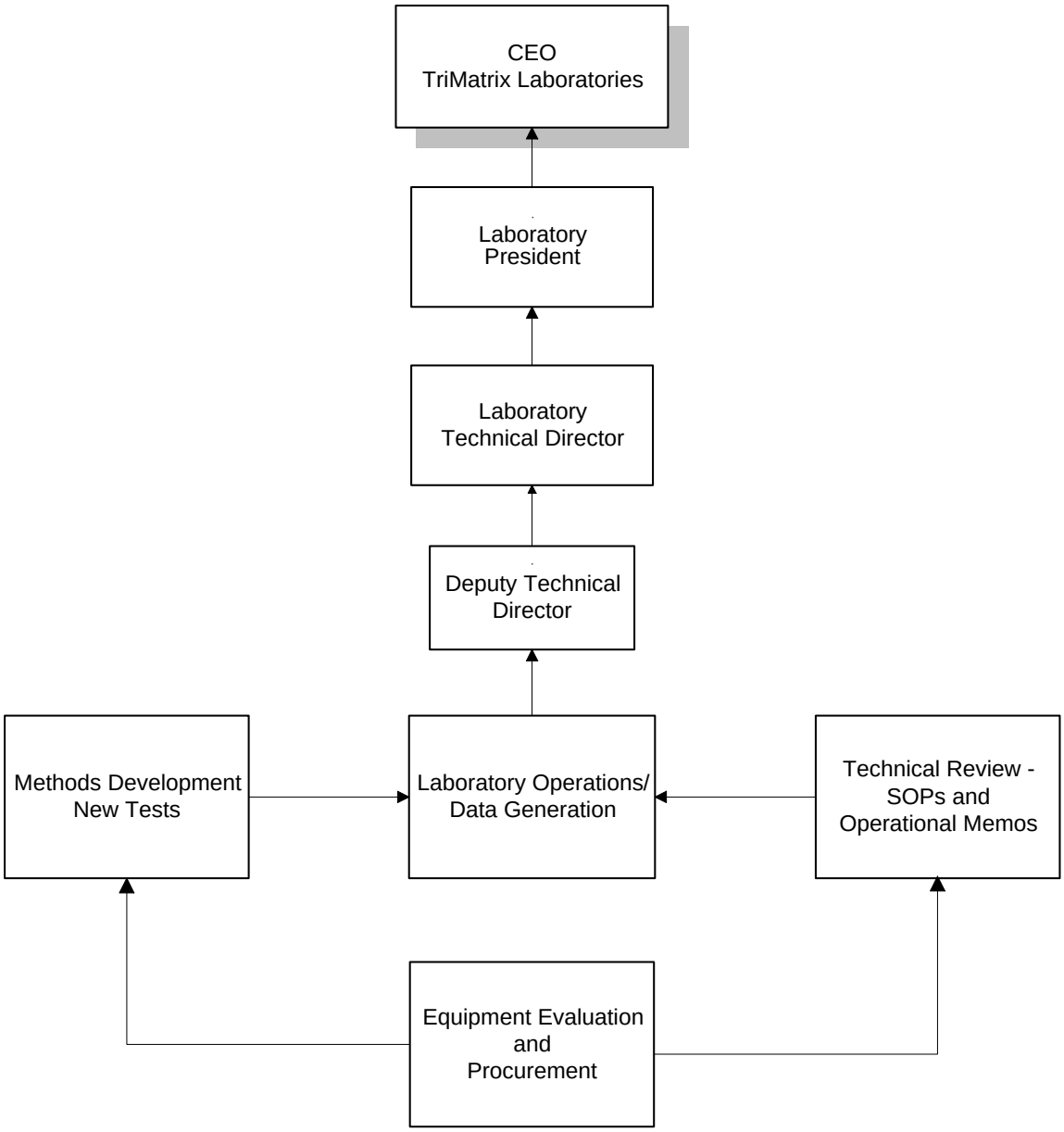


Figure 3-4

RELATIONSHIPS

Management to Support Services

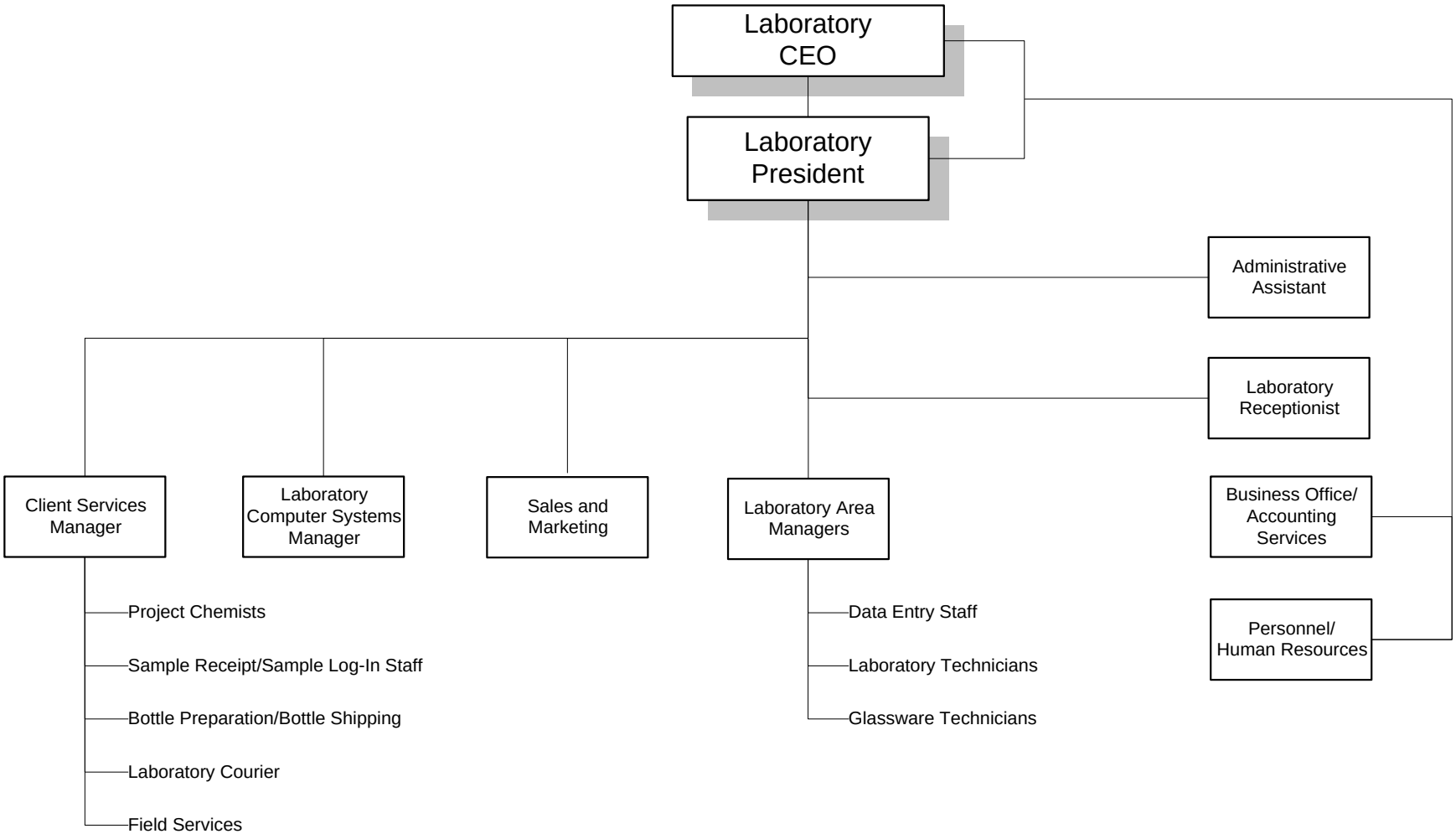


Figure 3-5

RELATIONSHIPS

Management to Quality System

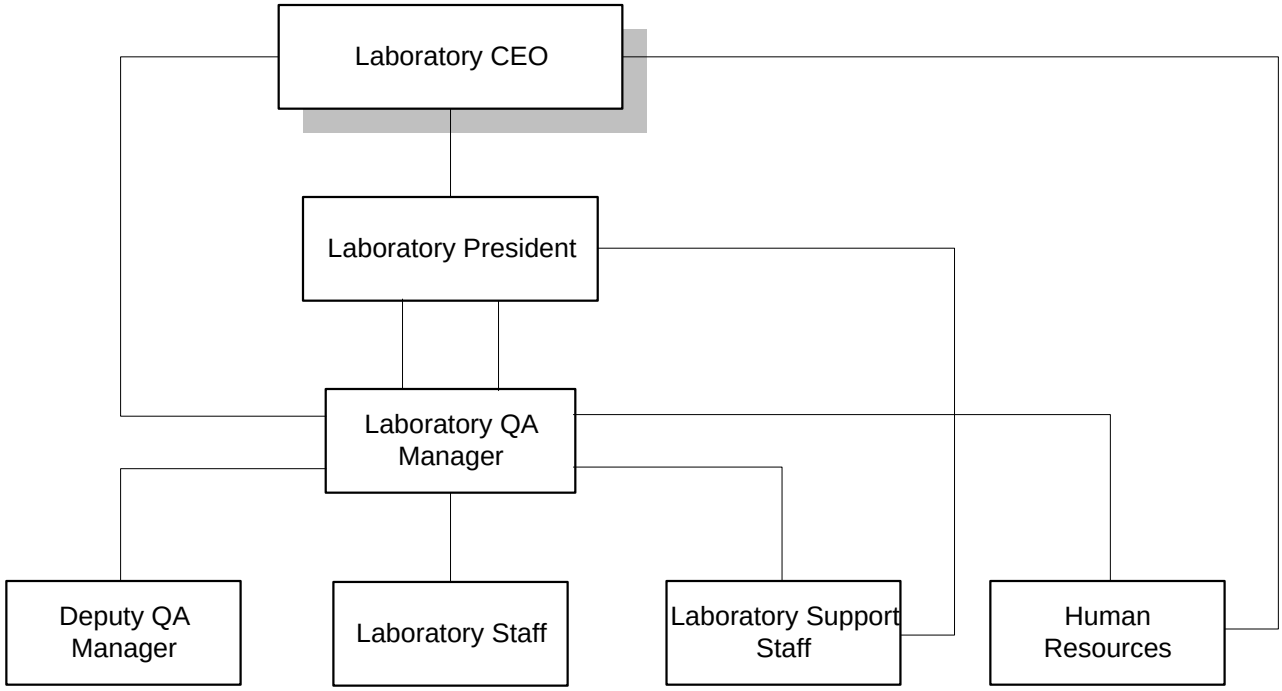


Figure 3-6

Laboratory Layout/Diagram

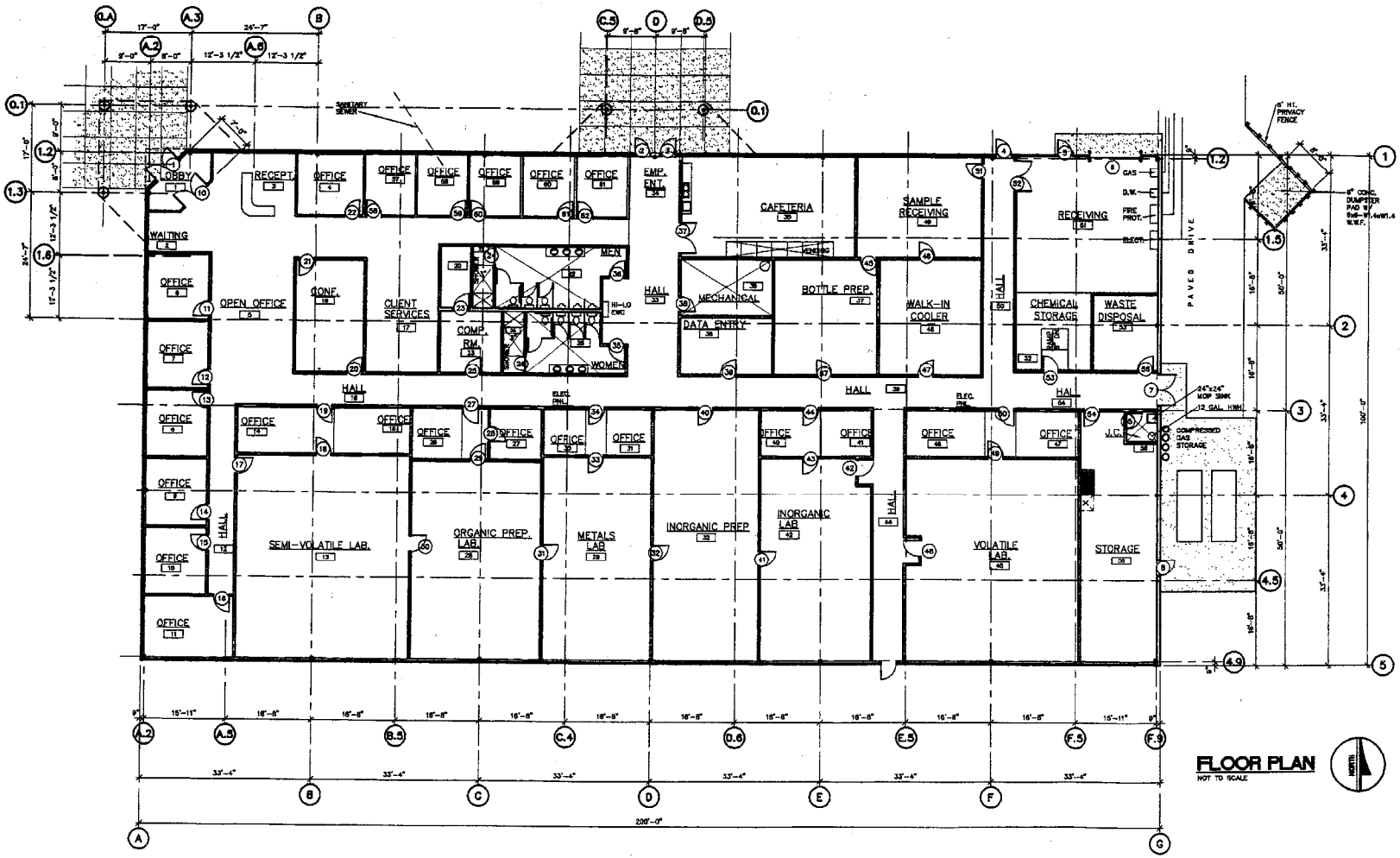
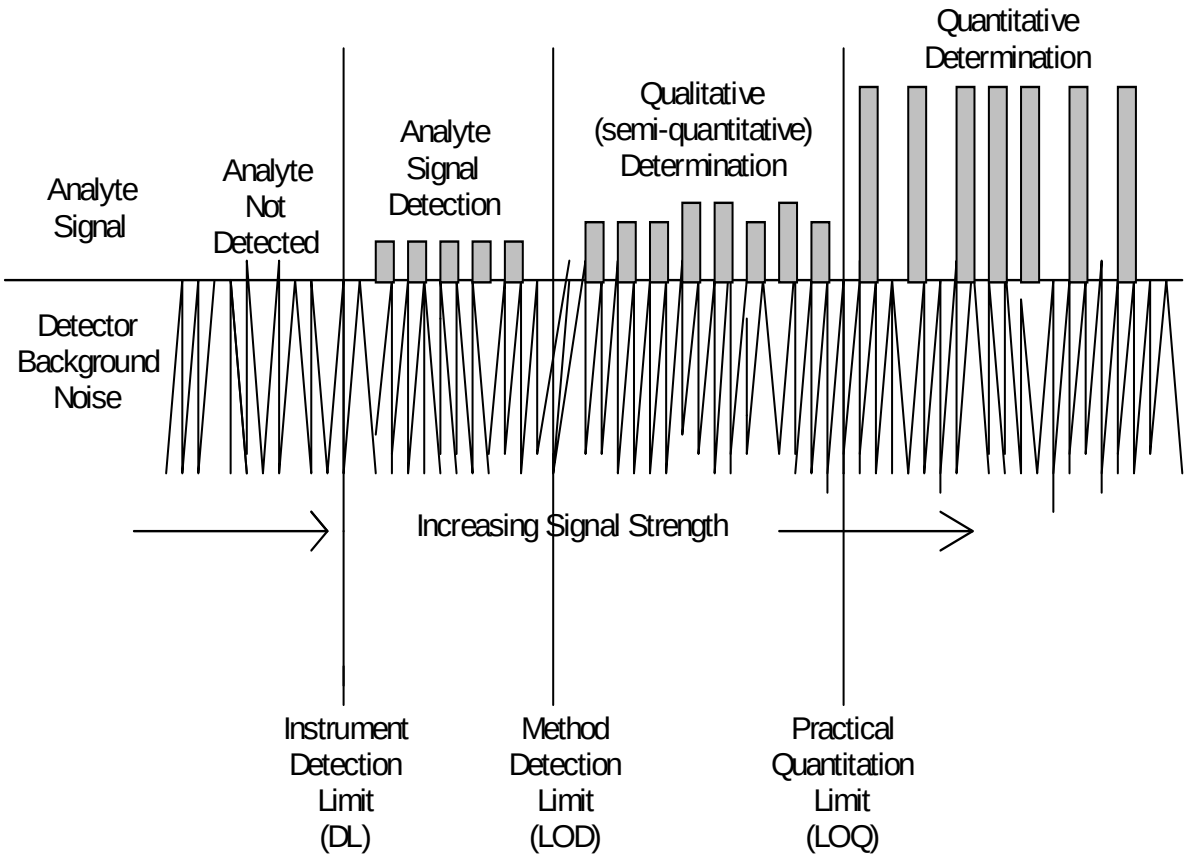


Figure 3-7

Regions of Analyte Signal



4.0 QUALITY CONTROL

4.1 DOCUMENT CONTROL AND MAINTENANCE

4.1.1 Procedures for the Control and Maintenance of Documentation

Documents utilized in the quality system are subject to strict control regarding their creation, revision, approval, use, and distribution. This applies to documents generated both internally, and those received from outside sources. Obsolete documents that are retained in circulation for either legal or knowledge preservation purposes are marked as “obsolete”. The structure of the documentation used in the TriMatrix quality system is presented in Figure 4-1.

4.1.1.1 Internal Documentation

Examples of internal documentation include Standard Operating Procedures, the Quality Assurance Manual, miscellaneous forms, and logbooks. All documents must be reviewed and approved by one or more senior staff prior to their use. All documents will print with both the file name and revision number. Where possible, the document will contain the TriMatrix logo. All logbooks must be bound and paginated.

All approved documents are stored on the laboratory intranet read only drive designated as “Library.” Document control is maintained through the use of the laboratory computer network. By maintaining only the current version of an approved document on the Library drive, document control and security are maintained. This procedure provides immediate access to the latest revision of all documents.

Document revisions may be made by any qualified, laboratory employee. Minor document revisions, such as those required to a Standard Operating Procedure, may be made by hand. All hand amendments must be legible, dated and initialed, and recorded in ink. All hand amendments must be approved by, and distributed

through, the Quality Assurance Department. Hand amendments will be incorporated into the next revision of the document. Extensive revisions require a formal document update.

Some documents, such as the QAM, require periodic reviews. The QAM is reviewed annually and updated as necessary.

Completed logbooks are numbered, scanned, and the resulting .pdf file archived on the Library drive.

4.1.1.2 External Documentation

Examples of external documentation include regulations, analytical methods, QAPPs, and client required standards. These documents are maintained by the quality assurance department. When possible, the documents are stored electronically on the Library drive. Instrument manuals are controlled by the individual laboratory areas.

4.1.2 Traceability of Measurements/Documentation Requirements

A properly designed and implemented documentation protocol will assure that all information presented in an analytical report can be traced back to its point of origin. The documentation protocol must also provide for traceability of non-reported information used to provide supporting value to the analytical report. These items include but are not limited to: stock standard records, test calibration records, data reduction and validation activities, sample custody, facilities monitoring, and final data reporting.

4.1.3 Paperwork/Information Flow

As displayed in Figure 4-2, document flow remains constant regardless of the quality control requirements of the sample. The records trace can provide for the following:

- Answers to questions of analytical integrity
- Assistance in finding and solving random and systematic problems
- Assistance in preventing long term degradation of the analytical process

- Assistance in ensuring continuity of analytical effort despite personnel and mechanical changes

The following subsections identify and describe the procedures followed, and the corresponding documents generated, from project initiation through completion.

4.1.3.1 Project Initiation

All samples or sample groups entering the analytical process must be accompanied by the appropriate documentation. This documentation is necessary to define the analytical goals and project objectives. Information concerning analytes, reporting limits, and reporting formats must be provided. An inventory of required sample containers must be prepared for each sampling event. This inventory is documented using the Container Packing List (Appendix O).

All projects are initiated through the LIMS system. All documents created during the project initiation phase are maintained and archived to the client filing system.

4.1.3.2 Sample Receipt/Examination

The receipt of all sample shipping coolers (empty or full) will be documented in the Sample Receipt Record Logbook (Appendix P). This logbook documents the delivery method, date and time, number of coolers received, client, and the name of the TriMatrix employee who received the cooler. This information is entered into the logbook immediately after drop-off.

Observations on the receipt of each sample delivery group, including sample temperatures, are documented on the “Sample Receiving/Log-in Checklist” (Appendix Q). This form was designed in a step-by-step format to walk the log-in technician through all the steps required when receiving and logging-in samples. A supplemental “Sample Receiving/Log-in Checklist

Additional Cooler Information" form is available when receiving projects consisting of more than four coolers (Appendix R).

Various additional forms such as the "Sample Preservation Verification Form" (Appendix S) and the "Sample Receiving Non-Conformance Report" (Appendix T) are also completed.

4.1.3.3 Sample Log-In

During log-in, a series of computer entry functions are performed in an effort to document and validate the log-in process. The remainder of the Checklist is also used to record the completion of the various steps that must be followed when logging samples into the LIMS system. Once complete, bottle tags are produced and a Work Order generated for the project chemist (Appendix U). The log-in technician will create folder for each work order received. This folder is labeled with the LIMS generated work order and will contain all documents associated with the log-in process. These documents will include: all external chain-of-custody forms, sample preservation records, shipping records, any client correspondence, and a copy of the actual log for each submittal. Upon completion of the analytical process, the project file becomes part of the permanent record of each project.

4.1.3.4 Worklists/Benchsheets

The worklists and benchsheets produced by the LIMS system are designed to provide the analyst with essential project information. This information not only includes client/project specifications, but also provides an avenue for communication of test specifications and parameter expiration dates and times. This up-front information enables the analyst to make informed decisions in their analytical scheme, and helps minimize problems after samples are analyzed.

Examples of laboratory area work orders are presented in Appendix V.

4.1.3.5 Management Reports

Several reports are provided within the TriMatrix laboratory system to help monitor operational conditions of the laboratory. These reports include workload reports, on-time reports, and aging logs.

The flow of information from these various reports is geared to a variety of personnel within the management structure of the laboratory, and to specific persons outside the laboratory. Examples of management reports are presented in Appendix W.

4.1.3.6 Quality Assurance Reports

Quality assurance reports play a vital role in the management of the quality system. Quality systems must be closely scrutinized in order to monitor, maintain, adjust, and add, procedures or systems to meet existing and new QA objectives of the laboratory.

Several quality assurance reports are created in this effort. These reports serve different functions and are designed to inform the ultimate user. In the case of a client/invoice report the quality assurance data is presented to facilitate the objectives of the project requirements from data assessment through full 3rd party data validation.

Quality control reports are also used extensively within TriMatrix to assess the analytical process. Many of these reports are utilized daily to monitor, for example – method accuracy, precision, completeness, and to provide the means for overall data assessment at the batch level. All QC reports are created through the LIMS system. Examples of efforts available for this monitoring process are presented in Appendix X.

4.1.3.7 Project Files

The project file is the comprehensive record of every analytical project completed at TriMatrix. Project files are stored in secure filing cabinets. Items typically retained in a project file include:

- Initial project report/analysis plan/proposal
- All correspondence or documents mailed or received with the samples
- Written record of client phone conversations
- All sample receiving/log-in forms
- Chain-of-custody forms
- Laboratory worksheets
- Invoice copy

To save paper and file space, electronic, rather than paper, copies of final reports are typically retained. Reports can be regenerated on demand.

By default, project files are stored on-site for 1 year, followed by off-site storage at a secured limited access facility for an additional 6 years. Length of storage requirements are determined on a client/project specific basis. If the ownership of the laboratory changes, record storage will become the responsibility of the new owner. In the event the laboratory was to go out of business, each client will be contacted for instructions on record disposition. Client records will be transferred or destroyed as instructed. Access to archived information is documented with an access log (Appendix Y)

4.1.3.8 Quality Control Documents

A) Instrument Logbooks

Two different instrument logbooks are maintained, an Instrument Run-Log and an Instrument Maintenance Log. Each log plays an important role in the documentation of daily instrument activities.

The Instrument Run Logbook is used to document all analytical determinations of a designated instrument. These determinations include not only sample analyses, but also recordings of all calibration and calibration runs, quality control analyses, and where applicable, instrument tuning activities.

The Instrument Run Logbook provides a chronology of each day's analyses. This chronology plays an important role in the data validation process. All run logs are identified by instrument manufacturer name, model number, serial number, and the starting and ending dates encompassed. All completed run logs are issued document control numbers, inventoried, and properly archived.

The Instrument Maintenance Log is used to document instrument maintenance procedures, repairs, or modifications. All activities are documented by recording what was done, by whom, and why.

All completed maintenance logs are identified by instrument manufacturer name and model number, instrument serial number, and the dates encompassed. All maintenance logs are issued document control numbers, inventoried, and properly archived.

B) Controlled Temperature Units (CTU)

Each oven and incubator used for sample processing, and all cold sample and standard storage devices have their temperatures monitored and recorded on a daily basis. Within each CTU is a certified thermometer. Additionally, each CTU used for sample storage, and incubators used for BOD and bacteriological incubation have their weekend temperature monitored via electronic data loggers. The calibration of liquid and digital thermometers is verified annually.

All temperature readings and thermometer calibrations are recorded in the CTU Logbook. This logbook contains a page for

each unit with detailed information on unit identification, serial number, laboratory location, and designated operating temperature. All CTU logbooks are issued document control numbers, inventoried, and properly archived. An example of a Controlled Temperature Log is presented in Appendix Z.

C) Balance Monitoring

Each analytical and top loading balance used at TriMatrix is monitored for accuracy. All daily checks are recorded in the TriMatrix Balance Log (Appendix AA). All balance logbooks are issued document control numbers, inventoried, and properly archived.

D) Standard and Reagent Preparation Logbooks

All standards and calibration solutions used at TriMatrix are prepared, when possible, from reagents or solutions traceable to national standards. Whether a stock, an intermediate, or a working concentration, each reagent and standard solution is traceable to its origin. This is accomplished within the laboratory's LIMS system (Appendix AB).

Information available on each standard includes:

- The analyte or analytes contained in the standard
- The concentration
- The solvent used to prepare the standard
- The preservative (i.e., nitric acid)
- The date of preparation
- Initials of the preparer
- The expiration date
- The unique identification number

Unique identification numbers are generated by the LIMS system and/or a book, page, and line number system. All standard and

reagent preparation logbooks are issued document control numbers, inventoried, and properly archived.

E) Pipet Logs

All autopipetors utilized for the delivery of standard solutions, diluents, and reagents, are periodically checked for delivery accuracy. Because these pipetors contain mechanical parts they are subject to inaccuracies if not properly maintained and calibrated.

Daily calibrations (for pipets used to prepare standards), and weekly calibrations (for pipets used to prepare quality control samples) are recorded in the Pipet Calibration Logbook (Appendix AC). Each log is identified by manufacturer name and model number, the pipetor serial number (if available), and the starting and ending dates encompassed. All complete pipet logbooks are assigned document control numbers, inventoried, and properly archived.

4.1.3.9 Confidentiality and Proprietary Rights

Since significant amounts of information regarding the details of a client's operations are received in the laboratory it is essential that strict confidentiality be maintained in the handling of all client information. Client data is protected in locked filing cabinets and in limited access computer files. Under no circumstances is the name of a client, or any information regarding that client, revealed to another client or to a regulatory agency without the client's written permission, under penalty of employment termination.

Any details of a client's operations that have necessarily been revealed to the laboratory for testing purposes are considered as proprietary and protected by patents, copyrights, infringement laws, or other legal constraints against disclosure.

4.1.3.10 Document Storage and Traceability

Archiving of information at TriMatrix has been designed to meet both short-term and long-term storage needs. Archives are maintained for a wide variety of data and documentation. These archives can be categorized into two main groups, a) document archives (physical documents) and b) electronic archives (data files). Table 1 illustrates the current TriMatrix archival systems, their location, and duration.

Documentation records or logs are maintained for all archival systems to aid in the quick retrieval of information. Extended archival periods or special procedures are also in place for some projects and clients.

4.1.4 Standard Operating Procedures (SOPs)

Many of the methods published today by various agencies provide only general guidance in performing an analytical determination. A significant part of the variability observed in analytical data is in large part due to minor variations in the analytical process. A Standard Operating Procedure is a guide that clearly defines the exact steps to be followed while performing a procedure. The delineation of these exact steps in an SOP will improve the analytical conditions, which in turn will help the overall reproduction of analytical data.

4.1.4.1 SOP Categories

SOPs are written for nearly all laboratory activities. The categories utilized in the organization of SOPs are presented in Table 2.

4.1.4.2 SOP Development, Formatting, and Review

All standard operating procedures are developed and written to the specifications outlined in the TriMatrix guidelines for the preparation of a SOP. These guidelines are presented in SOP format and have been designed to accommodate analytical tests, non-tests such as extractions or digestions, and documentation or non-analytical activities. The guidelines were developed from both USEPA and NELAC protocols for the creation of standard operating procedures.

All SOPs developed by TriMatrix are subject to a review process where signatures or approvals are required from the appropriate area manager, the quality assurance department, and the laboratory president (Appendix AD).

SOPs are reviewed and updated as necessary. Minor modifications can be hand edited on the SOP. These modifications must be made through the Quality Assurance Department. Depending on the modification, distribution of the edited SOP (as described below) may or may not be required. All minor modifications will be incorporated into the next revision of the SOP. Major modifications may require the SOP to undergo an immediate formal update.

4.1.4.3 SOP Documentation and Control

All SOPs are assigned a unique procedure identifier. Other information included in every SOP is the effective date, revision number, information on the author, total number of pages, and identification of any individual page revisions.

All original, approved paper copies of TriMatrix SOPs are controlled by the Quality Assurance department. Approved SOPs are scanned and stored on the network Library drive. This drive is accessible to all laboratory personnel. Copies of all outdated SOPs are destroyed (or marked as obsolete), and the scanned copy removed from the Library drive.

4.1.5 LIMS

TriMatrix utilizes the Element LIMS system developed by Promium Corporation. This system controls all aspects of laboratory operations. The main functions of the LIMS system are:

- Project Management
- Sample Management

- Work Scheduling and Management
- Data Entry, Verification, and Approval
- Report Generation
- Invoicing

4.2 SAMPLE CONTROL, FLOW, AND STORAGE

Presented in the following section is a description of the policies and procedures that were developed to identify, monitor, and document the flow of samples through the laboratory. A flow chart depicting this process is presented in Figure 4-3.

4.2.1 Project Initiation

When samples are received at TriMatrix, the necessary information that will direct the analytical scheme has already been developed and implemented within the project initiation/project management process. This process starts with the award of a contract or proposal, a client request, or a pre-scheduled sampling event. The basic steps and supporting documentation involved in the project initiation process begins with the gathering of project information, communications with all affected laboratory areas, and the input of required project related data into the LIMS system. All requests for analytical work are reviewed by the project chemist, and when necessary, applicable management staff in order to verify the laboratory has the capability to perform the requested tests and meet the requested turnaround times. Requests for changes to in-progress projects must be made with the appropriate project chemist. Changes in methodology will typically require client approval. The project chemist will be responsible for coordinating all requests for changes with the impacted laboratory areas. All approved changes will be formally made via the LIMS system, thus continuing the normal paperwork flow.

TriMatrix uses test methods that meet the needs of the client and are appropriate for the tests undertaken. Methods published in international, regional, or national standards are used. TriMatrix uses the latest valid edition of a method unless it is not appropriate or possible to do so. Laboratory developed methods (or methods adopted by the laboratory) are also used when appropriate for the intended use, and have been validated following the various initial demonstration of capability procedures. When specified by the

client, TriMatrix will inform the client if the specified method is considered inappropriate, or out of date. All analytical procedures are documented in SOPs supplemented with additional details to ensure consistent application.

Routine projects include sample matrixes and analyses that are continuously processed by TriMatrix. Non-routine projects are those that require special analyses, include parameters not routinely run by the laboratory, posses unique holding times, or require expedited turnaround. Non-routine projects will require approval from all affected laboratory areas.

Occasionally, a portion of a project may involve an analytical methodology not currently possible at TriMatrix. When requested by the client, samples for analyses outside the analytical scope of TriMatrix can be subcontracted to another laboratory. It is preferred that the client specify the subcontract laboratory. When the subcontract lab is not specified by the client, TriMatrix will only subcontract to laboratories that are NELAP accredited, or ISO-17025 certified, for the specific method of interest. Client specific program requirements will take precedence over this rule. For example, Department of Defense work must only be subcontracted (with prior client project specific approval), to a DoD accredited laboratory. All subcontract laboratories specified by TriMatrix will be evaluated prior to use through the use of a qualification form (Appendix AE). An annual resubmission of the form is required.

A registry of subcontract laboratories used by TriMatrix will be maintained, documenting their NELAP accreditation or ISO-17025 certification. A separate registry will be maintained to document DoD accredited laboratories.

The development of a project within the laboratory also involves the preparation and shipment of sample collection materials and containers. The processes involved in the procurement, preparation, and shipment of sample collection materials and containers are presented in the sections below.

4.2.1.1 Sample Containers and Materials Procurement

TriMatrix utilizes only virgin bottle ware for all sample collection kits. All containers are purchased pre-cleaned and come with a Certificate of Analyses.

Specific projects or programs may require the laboratory to verify the cleanliness of the containers. When this is required specific lots will be sequestered from the container vendor. Each lot will be tested to verify the containers meet the project or program requirements. Only containers whose cleanliness has been verified will be used for the project.

4.2.1.2 Preparation of Containers

All sample containers utilized for the collection and preservation of environmental samples are prepared by the bottle prep group. The staff members of this group focus their activities exclusively in the area of sample container procurement, preparation, and shipping. Project sample container kits are requested using the Container Packing List, presented in Appendix O.

4.2.1.3 Sample Container Shipment

When all containers have been assembled as requested on the Master Bottle Packing List, the bottles are packaged and placed into one or more shipping coolers. 40 mL glass vials are packed in small bubble wrap bags. An attempt is made to organize each sample cooler to help minimize time spent in the field. When possible this is accomplished by packing bottles together by sample point. When complete, each shipping container will be inspected by a project chemist to verify its accuracy. Documentation of this inspection is made on the bottle packing list. A copy of the bottle packing list is placed in each cooler.

Also provided in each cooler is a set of instructions or comments about the containers, material safety data sheets for all chemical preservatives present, a return address label, an external COC form, and if required, TriMatrix sample bottle custody seals. All

materials are packaged in a waterproof zip-lock bag. Examples of these additional materials are presented in Appendix AF.

Packing is now added to the cooler and the shipping container is sealed. When requested, signed TriMatrix custody seals can also be applied to the outgoing cooler.

4.2.1.4 Sample Receipt

The receipt of all sample shipping coolers (empty or full) will be documented in the Sample Receipt Record logbook (Appendix P). This logbook documents the delivery method, date and time received, number of coolers received, client, and the name of the TriMatrix employee who received the cooler. This information is entered into the logbook immediately after drop-off.

As soon as possible after the shipping cooler is received and all available information entered into the Sample Receipt Record, cooler inspection and sample temperature determination occurs. The observations associated with this step by step process are recorded on the "Sample Receiving/Log-in Checklist" (Appendix Q). This Checklist must be completed for all samples for a given project received on a given day. A supplemental "Sample Receiving/Log-in Checklist Additional Cooler Information" form is available when receiving projects consisting of more than four coolers (Appendix R).

IMPORTANT: When initiating each Checklist, make sure the Receipt Log Page/Line number from the Sample Receipt Record logbook is recorded at the top of each Checklist. This ties the receipt of the sample coolers in with the samples themselves.

Record the cooler number of the first cooler and the current time. Observe and record the type of coolant used. Provided sufficient containers are received, measure and record the temperature of

three random samples from locations representative of the coolant present in the cooler. If a temperature blank was received, measure and record this temperature as well.

Temperatures are recorded using a calibrated infrared thermometer. Because this type of thermometer is actually measuring the temperature of the container, it is critical that the temperature is taken as the sample is removed from the cooler. The container warms up quickly and any other method will result in an incorrect reading. Do not dry the container prior to measuring the temperature. Containers wet from melt water are preferred to dry containers. Record the temperature values on the Checklist. Report all temperatures to the nearest 0.1° C. If a correction factor is necessary, record the correction factor and the corrected temperature on the Checklist. Average the three sample results and also report the average. If any temperature exceeds the 6° C it must be noted on the Checklist and documented in a non-conformance report.

NOTE: Samples hand delivered to the laboratory on the same day they were collected whose temperature exceeds 6° C will be considered acceptable if the samples are received well packed in ice. A non-conformance report will not be necessary, however, documentation must be provided to validate the delivery method, the collection date and time, and that the samples were received well packed on ice.

4.2.1.5 Sample Examination

Samples received at TriMatrix are required to be accompanied by a TriMatrix Laboratory Chain-of-Custody (COC) form (Appendix AG). For samples received without this form, the log-in technician will initiate the COC process. Should a submittal or delivery group be identified as an internal COC project, the log-in technician will initiate the procedures outlined in section 4.2.2 B.

The remainder of page 1 of the Checklist is now filled in. Observations are made on the accuracy of the COC and the condition of the sample containers. Many of the aqueous samples received have been subjected to some form of chemical preservation. Verification of the preservation is required; however, depending on the analysis this verification may not occur during the log-in process. The “Sample Preservation Verification Form” (Appendix S) specifies what container types will have their preservation checked during log-in. Container types that are not checked include aldehydes, bacteriologicals, oil and grease, semi-volatile and diesel range organics, total organic carbon, total organic halides, total petroleum hydrocarbons, and volatile organics. The form also specifies what container types can have an incorrect preservation adjusted. Preservation verification is performed via a pH check using calibrated pH strips. Determine the correct reading against the color chart on the pH strip container. Document the pH found on the Sample Preservation Verification Form. Use only the pH strips located in the log-in area whose calibration has been verified and recorded in the pH Strip Calibration Logbook (Appendix AH).

Should a) the result of any preservation check indicate that the sample has not been properly preserved in the field (or the buffering capacity of the sample has resulted in an unacceptable sample pH at receipt) or b) there is insufficient evidence indicating that other needed preservation reagents (e.g., Zinc Acetate for Sulfides) have been added, then a Sample Receiving Non-Conformance Report (Appendix T) must be initiated and the project chemist contacted as soon as possible. In some instances, the holding time of such samples may be shortened. No preservation adjustment may be made without approval from a project chemist.

IMPORTANT: Shaded boxes on the Checklist indicate an out-of-control situation. The selection of any shaded box during the completion of this form also requires the initiation of the Sample Receiving Non-Conformance Report.

Collect all paperwork and deliver to the appropriate project chemist for review. Any issues that require contact with the client for resolution will be made in a timely manner by the project chemist. The project chemist will create a project and schedule in the LIMS system and return the paperwork to sample receiving. Once the project chemist returns the paperwork, page 2 of the Log-In Checklist will be completed and the samples will be logged into the LIMS system.

4.2.1.6 Sample Log-In

All samples received by TriMatrix are logged into the LIMS system. The log-in procedure assigns a unique TriMatrix sample number to each sample, allowing samples to be tracked, data stored, and quality control associated for any sequence of events during a particular analytical period. The primary steps involved in the sample log-in process are presented below.

4.2.1.7 Sample Splitting

In the event that TriMatrix is unable to provide sample bottles, or circumstances prevent the splitting of samples in the field, the log-in technician can provide sample splitting services; however, sample splitting will typically be performed by a laboratory area chemist. These services include taking the sample as received and sub-sampling it into the appropriate bottle with the preservative requirements as set forward in Appendix AI – Sample Collection Guidelines Bottle and Preservative Requirements. Sample splitting will only be performed when instructed by a laboratory project chemist with client approval.

A) Sample Splitting-Water Samples

Laboratory area managers will be consulted in order to insure that sufficient volume will be available to all areas of the lab after splitting. In the event that sufficient volume does not exist, the Project Chemist will be immediately notified for resolution.

When a bulk sample arrives for both organic and inorganic analysis, and sufficient sample exists, the organic aliquots will be removed first. The remainder of the sample will be transferred to properly preserved containers for each inorganic analyses.

B) Sample Splitting-Solid Samples

When solid samples, such as sediment or soil, are to be received at TriMatrix, every attempt will be made by the Project Chemist and field sampling personnel to insure that two samples are provided as replicates for the appropriate tests. One of these samples will be assigned to the organic area and the other to the inorganic area. If only one sample is received and organic analyses are required, the organic aliquots will be removed first. Prior to sub-sampling, solid samples will be made homogeneous by either one or all of the following manners:

- Stirring
- Grinding
- Particle separation (sieving)

The laboratory area manager is responsible for deciding how a solid sample will be split. Problems or concerns that may arise on splitting a solid sample will be addressed by the Project Chemist and Laboratory Area Manager. After the organic portions have been removed or split, the remaining sample will be provided to the inorganic facilities.

4.2.1.8 Sample Distribution

All samples received at TriMatrix are labeled by the log-in technician. These labels include both the necessary information for proper identification, and information on any potential for flammability, reactivity, contact, or health based risks.

After completing the log-in process of all the various samples connected with a particular project, the log-in technician will store the samples in the correct Controlled Temperature Unit (CTU).

- Routine Water and Solid Samples: Samples that require refrigeration will be stored in the CTU designated for all routine water and soil samples.

- Routine Volatile Water and Solid Samples: All volatile samples are stored in designated VOA CTUs. Volatile water and soil samples are segregated and stored separately. No other sample types are stored in the VOA CTUs.

  All CTUs used for VOA sample storage will also contain a storage blank. The storage blank is a preserved 40 mL VOA vial filled with deionized/distilled water. The storage blank is replaced and analyzed on a weekly basis. The storage blank is analyzed by mass spectrometer for an extensive list of volatile analytes. A TIC scan is also performed. A separate storage blank is also analyzed for alcohols when applicable Department of Defense samples have been received. If positive results are observed for any target analyte above the laboratory's minimum reporting limit, all samples stored concurrently in the CTU must be evaluated for possible contamination. All sample results within 5 times the level quantitated in the storage blank must be qualified as estimated.

- Odoriferous and Hazardous Samples: Stored separately in a special vented facility. If volatile analyses are to be performed, samples are stored under refrigeration. Samples are identified

to the laboratory by means of a narrative within the LIMS System.

All samples that are involved as physical evidence in a legal procedure or simply identified as Chain-of-Custody will be handled under COC procedural safeguards.

4.2.2 Chain-of-Custody (COC)

All samples received by the laboratory require some form of chain-of-custody (COC). TriMatrix practices two levels of COC, external and internal. The degree of custody tracking and documentation is driven by the final deposition of the laboratory data. Generally, if samples and their analytical results are subject to involvement as physical evidence or in a legal procedure, both external and internal custody procedures will be followed. If samples or results are not subject to legal procedures, only external COC procedures will be followed. A description of these two custody scenarios is presented as follows:

A) External COC

Samples only requiring external COC will have their custody tracked from sample collection to delivery at the laboratory. This process involves the completion of a TriMatrix external COC form, as presented in Appendix AG. This form accompanies the sample containers prepared by TriMatrix to the sample collection site. Any sample or submittal received at the laboratory without a TriMatrix external COC form will initiate a process where the log-in technician will complete the necessary external COC forms for carrier sign-off.

For document control purposes, all external COC forms have a unique identification number.

B) Internal COC

Samples requiring strict COC will initiate the process by which all events or periods of sample handling will require a traceable document protocol.

The internal COC process involves the completion of a TriMatrix internal COC form for all phases of the analytical process. This includes sample extractions,

distillations, digestions, analyses, and disposal. An example of the TriMatrix internal COC form is presented in Appendix AJ. All internal COC forms are maintained in a series of submittal or delivery group folders.

C) Sample Security

All samples, whether under external or internal COC protocols, are maintained in a limited access secured area. This level of security is applied to all phases of the analytical process from sample log-in to final sample disposal.

D) Sample Disposal

All samples received are subject to disposal as waste. Discarded samples fall into three general categories:

1. Returned to the client (if highly contaminated).

2. Too contaminated for municipal disposal and must be disposed of as waste through a hazardous waste facility.

3. Inert, uncontaminated, and nontoxic samples in accordance with municipal waste regulations may be disposed of in the municipal dumpster and/or the laboratory waste room sink leading to the city sewer.

4.2.3 General Laboratory Security

Access to the laboratory is handled in a secure fashion, with access restricted to authorized personnel only. In addition to the laboratory areas, sample storage, sample container preparation, sample preparation, sample disposal, analytical documents, and data files, are restricted access areas. Non-authorized personnel may enter these areas only when escorted by a laboratory staff member.

It is the responsibility of all laboratory staff members to insure that the rules of restricted access are followed and maintained at all times.

4.3 CALIBRATION AND CALIBRATION VERIFICATION

This section describes procedures for maintaining the accuracy of all the instruments and measuring equipment used in conducting laboratory analyses. Calibration of the instruments and equipment is performed prior to each use or on a scheduled periodic basis.

Calibration of laboratory instruments and equipment is performed to verify that the analysis portion of the testing process is functioning properly and at the required sensitivity. A calibration section included in each analytical SOP covers the frequency, stability, and specific calibration steps, based on analytical method requirements and instrument or equipment manufacturer's recommendations.

Initial calibration is performed using standards of certified value to establish the linear range of the analysis for the analytes of interest. Each calibration curve is verified using a Second Source Calibration Verification Standard (SCV) prepared from a source dissimilar to that used in the preparation of the calibration standards. The calibration is also verified at the beginning and during the analytical sequence, using a standard prepared from the same source as that used in the initial calibration.

Calibration activities are divided into three categories:

Field Equipment (section 4.3.1)
Laboratory Instrumentation (section 4.3.2)
Laboratory Equipment (section 4.3.3)

4.3.1 Field Equipment

Perform daily calibration checks on field equipment prior to the commencement of any field analyses. Follow the written calibration procedure for each individual piece of field equipment. The equipment is held out of service until repairs and successful recalibration occurs. A summary table of all calibration procedures and frequencies is included (Table 3).

4.3.2 Laboratory Instrumentation

Calibration of laboratory instruments is based on approved SOPs. Records of calibration, repairs, or replacement are filed and maintained by the designated laboratory analyst. These records are filed at the location where the work is

performed and are subject to QA audit. For all instruments, the laboratory maintains in-house spare parts or service contracts with vendors. A summary table of method calibration procedures and frequencies is included (Table 4); however, program requirements may differ. Any instrument that does not pass daily quality requirements must be removed from service until repairs or successful recalibration occurs. Instruments removed from service must be flagged as such (Appendix AK).

4.3.2.1 Inorganic/Classical Chemistries

The inorganic laboratory utilizes a wide variety of wet-chemical procedures and instruments. Calibration steps vary depending on the specific analytical method being utilized. However, certain general principles of calibration apply to all inorganics testing. Every analytical method requires calibration or calibration verification prior to sample analysis. Using a group of certified standards, the linear range is defined. The calibration is checked on a continuing basis to be certain that the method is within the required test parameters. All inorganic calibrations must meet the specific requirements described below unless required otherwise by the method or manufacturer.

The instrumentation is calibrated using standards prepared by dilution of stock solutions. One standard is prepared at the reporting limit of the analyte of interest while the other standards bracket the concentration range. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, if the corresponding standard is eliminated from the calibration curve.

An SCV originating from a stock solution dissimilar to that used for preparation of the calibration standards is prepared and analyzed. Continuing Calibration Verification blanks and standards (same source as that used in the initial calibration curve) are run at the

beginning, and periodically, throughout the analytical sequence, typically after every 10 analyses. The value of the continuing calibration standard concentration must agree within the method specified criteria; generally ±15 percent of the initial value or appropriate corrective action is taken. Corrective action may include recalibrating the instrument and must include reanalyzing the previous 10 samples.

4.3.2.2 AAS/ICP/MS Emission Systems

The atomic absorption spectrophotometer (AAS), inductively coupled plasma emission spectrophotometer (ICP), and inductively coupled plasma mass spectrometer (ICP/MS) instruments are calibrated by the use of a minimum of three calibration standards (6 for ICP/MS) prepared by dilution of certified stock solutions. One standard is prepared at the reporting limit of the analyte of interest while the other standards bracket the concentration range. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, if the corresponding standard is eliminated from the calibration curve. Calibration standards contain acids at the same concentration as the digestates. A continuing calibration standard is analyzed after every 10 samples. The value of the continuing calibration standard concentration must agree within method specified criteria, generally ±10 percent of the initial value or appropriate corrective action is taken. Corrective action may include recalibrating the instrument and must include reanalyzing the previous ten samples.

4.3.2.3 Gas/Liquid Chromatography

Analysis performed by gas chromatography follows USEPA protocols. The instrument is calibrated using three or five point calibration curves (depending on method requirements) for both volatile and semi-volatile compounds. One standard is prepared at

the reporting limit of the analyte of interest while the other standards bracket the concentration range. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, if the corresponding standard is eliminated from the calibration curve. Continuing calibrations are performed after every ten samples. The value of the continuing calibration standard must agree within ±15 or 20 percent (depending on method requirements) of the initial value or the appropriate corrective action is taken, which may include recalibrating the instrument and must include reanalyzing the previous ten samples.

4.3.2.4 Gas Chromatography/Mass Spectrometry (GC/MS)

Prior to calibration, the instruments used for GC/MS analyses are tuned by analysis of p-bromofluorobenzene (BFB) for volatile analyses and decafluorotriphenylphosphine (DFTPP) for semi-volatile analyses. Once the tuning criteria for these reference compounds are met, the instrument is initially calibrated using a three or five point calibration curve (depending on method requirements). One standard is prepared at the reporting limit of the analyte of interest while the other standards bracket the concentration range. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must still be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, if the corresponding standard is eliminated from the calibration curve. The instrument tune will be verified each 12 or 24 hours of operation (depending on method requirements). Continuing calibration is verified as specified in the method. The calibration standards are commercially available certified standards containing the target analytes, surrogate spikes, and internal standards.

4.3.3 Laboratory Equipment

Personnel performing calibration should also be alert for any condition that renders a piece of equipment inoperable or unfit for use; for example, inspect thermometers to ensure that mercury or alcohol columns are not separated. If an equipment malfunction is noted the equipment must be removed from service until repairs or successful recalibration occurs. Instruments removed from service must be flagged as such (Appendix AK). Record all malfunctions, repairs, and re-calibrations in the appropriate logbook.

Maintain records for each piece of equipment requiring calibration, showing equipment description and identification number, calibration frequency and acceptable tolerances, personnel performance calibration, date, reference material used, calibration results including acceptance or failure, removal from service, repairs, and date and authorization for return to service.

4.3.3.1 Balances

An annual third party maintenance and calibration is performed on all balances. Daily calibration is performed by TriMatrix on all balances using class S or higher NIST traceable weights. Provided daily calibration is successful the weights themselves are indirectly calibrated on a daily basis via the third party's calibration; therefore, re-certification or replacement of the weights is not required every five years.

4.3.3.2 Thermometers

Thermometer calibration is performed annually, using a NIST certified thermometer. The NIST thermometer must be re-certified or purchased new every five years. Written records are maintained of all annual calibrations.

4.4 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction is the process by which raw analytical data is tabulated and calculated. Data validation is the review of the data generation and reduction process. Data reporting is the compilation of all sample results for distribution to the client. All analytical

data generated by TriMatrix Laboratories is subjected to the reduction, validation, and reporting process as described below.

4.4.1 Laboratory Data

4.4.1.1 Data Reduction

Initial results for most analyses are calculated using a computer directly interfaced to the instument. Data reduction is accomplished using software that has been validated for its intended purpose. The initial result is exported to the LIMS system. Data such as initial volume, final volume, and percent solids, are used by the LIMS system to calculate a final result. When manual data reduction is required it is performed according to the written standard operating procedure for that analysis.

4.4.1.2 Manual Integrations

Manual integration is defined as any post acquisition adjustment to the automated software peak integration. Manual integrations are often times legitimately required to correct for baseline drift, noisy baselines, poorly resolved peaks, closely eluting or missed peaks, peak tailing, or peak splitting. Manual integration may never be used for the sole purpose of correcting failing quality control parameters (i.e. shaving or enhancing peak areas or heights to make failed calibrations, surrogates, or internal standards pass), or as a substitute for poor or ineffective sample cleanup. Manual integration must be used cautiously due to the increased scrutiny inherent with adjusted data. Particular attention will be paid to manual integrations performed on standards and blanks since these samples are typically free of interferences.

Before and after documentation must be provided with all manual integrations. This documentation must clearly show the original integration “before”, and the manual integration “after” baseline. Clear identification of manual integrations must be included in the case narrative for all samples analyzed under Federal Facilities

work requirements. All quantitation reports must clearly identify manual integrations by flagging the peak with a designator that cannot be removed by the analyst. Additional documentation requirements include:

- Date of the manual integration
- Reason for the manual integration
- The integration area or height before manual integration
- The integration area or height after manual integration
- A signature/date by both the analyst and the reviewer.

All manual integrations must be narrated. Two LIMS qualifiers have been written. Qualifier number DoD21 is used for reports that include copies of the raw data. It reads “Manual integration was performed on this sample for the analyte(s) listed below in accordance with the TriMatrix Manual Integration SOP. All necessary documentation, including the signed review, is included in the raw data section of the data package."

Qualifier number GN042 was written for reports that do not include copies of the raw data and reads, “Manual integration was required on the analytes listed below. All manual integrations were performed and reviewed in accordance with TriMatrix laboratory policy.”

The qualifiers must be used on all manual integrations. In addition to providing a narration, use of the qualifier also summarizes and identifies in the report all samples and analytes for which manual integration was necessary.

Any questions concerning manual integration must be resolved with the area manager or the quality assurance officer before final results are approved and released to the Project Chemist. The complete laboratory manual integration requirements are detailed in the TriMatrix manual integration SOP GR-10-115.

4.4.1.3 Data Validation

Data validation begins with the analyst. It is the basic responsibility of the analyst to produce data that is complete, correct, and conforms to all applicable methods and standard operating procedures. If results are not acceptable, it is the duty of the analyst to perform the appropriate corrective action and to thoroughly document that action. The analyst will verify the following before updating the analysis status to “Analyzed”:

- Applicable standard operating procedures were followed
- Proper analytical sequence was followed
- Sample preparation information was correct
- Calibration has been performed properly
- Analytical results are complete
- Holding times have been met
- Method criteria were met
- Any special sample preparation or analytical requirements have been achieved
- All analytical abnormalities have been noted
- Corrective actions are thoroughly described
- Good record keeping practices have been followed
- Any problems are communicated to area manager
- Data was correctly transferred to Element
- Calculations were performed properly
- Quality control samples are within established limits
- Documentation is complete
- Raw data, including chromatograms and instrument printouts are complete
- Case narrative or qualifier pages are complete

<u>Second Level Review</u>

A laboratory area peer or designated validator, in essence, performs the same validation steps performed by the analyst. Particular attention should be paid to:

- Dilution factors were entered correctly and detection limits elevated accordingly
- Analysis dates are correct
- Quality control and analytical batch information is correct
- Quality control results and spike amounts are correct and in control
- Project specific limits are correct
- Run a draft copy of the report, specific to the laboratory area, to verify all results have been adjusted correctly
- Any required qualifiers or narratives have been entered

Any problems must be resolved with the analyst, and when appropriate the quality assurance manager, prior to updating the status to “Reviewed.”

Third Level Review

Once all analyses associated with a work order have been entered into the LIMS system and approved, the project chemist will perform the Third Level Review. This review will verify that:

- The requirements of the client have been met
- All required narratives and qualifiers have been included
- All quality control parameters required are in the report
- Results of complimentary tests make sense
- The data is accurately presented
- Holding times have been met
- Calibration checks are sufficient
- Documentation is complete

Once this review is complete the project chemist will approve the data and generate a final report. It is during this time that any data package deliverables are collected and reviewed. When printed the work order status updates to "Reported."

Fourth Level Review

The project chemist will perform a final review of the data package hard copy to ensure that:

- All required data package components are complete and accounted for
- Quantitative results are correct
- The overall presentation of data to the client is in an understandable format

In addition to the formal data validation guidelines listed above for the analyst, area manager, and project chemist, there are many practical questions that all of these persons need to keep in mind when reviewing data and finished client reports. Among these "common-sense" evaluations of laboratory data are the following important considerations:

- Data makes good, sound, practical sense
- Multiple runs of the same samples relate, match, or are within acceptable range
- Data from complimentary analyses compares, i.e. COD>BOD>CBOD
- Total cyanide ≥ amenable and free cyanide
- Total solids ≥ suspended and dissolved solids
- TKN ≥ organic N + ammonia N
- Inorganic N = ammonia N + nitrate N + nitrite N
- TOC < BOD or COD
- Total phosphorus ≥ ortho phosphorus
- Calculated total dissolved solids/conductivity = 0.55 – 0.7

- Analytical run looks good; proper decisions were made
- Peaks from chromatogram or instrument printout look normal
- Computer identifications are correct
- Are qualitative/quantitative results real, especially low level
- Know and be sensitive to common laboratory contaminants
- Know area/analytical method pitfalls-be extra cautious
- All practices are sound and are supported by documentation-no appearance of random decisions

When complete the report will be signed. Data packages with deliverables will be scanned and archived. Work order status will be updated to "Completed".

4.4.2 Field Data

All data reduction, validation, and reporting for field activities must meet the same requirements as those required in the laboratory. Many of the field instruments, such as those measuring pH, dissolved oxygen, turbidity, temperature, and specific conductance, require a manual data printout from a computer interface. The analyst is responsible for immediate tabulation and calculation of raw data in the field. The field section manager must perform a prompt, on-site validation of field data before the opportunity is lost to perform any necessary field re-tests.

4.4.3 Subcontracted Data

Analytical results from subcontracted samples will be reported as an attachment to the TriMatrix data package. The attachment will contain the entire subcontracted data package as received by TriMatrix. To eliminate the impression that the subcontracted analyses were performed by TriMatrix, subcontracted results will always be appended to, never incorporated within, the TriMatrix LIMS generated report.

4.5 VERIFICATION PRACTICES - EXTERNAL/INTERNAL QUALITY CONTROL

4.5.1 Standard Reference Materials

A crucial step in the generation of quality data is the purity and traceability of reference materials used in the analyses. Reference materials may be physical standards (such as certified thermometers and weights used to calibrate laboratory thermometers and balances) or chemical standards (used to establish and check operational calibration of analytical methods). Physical standards should be traceable to the National Institute of Standards and Technology (NIST). Physical standards must be recalibrated (by an external vendor certified to perform the calibration), or purchased new every five years. Chemical reference materials of high quality can usually be obtained from reliable commercial vendors. For a given analysis, standard reference materials must be kept on hand from more than one vendor source. During the testing operation, standard reference materials from different vendor sources are crosschecked with each other.

4.5.2 Internal Quality Control Programs

TriMatrix routinely adds samples to the sample stream to demonstrate the total testing process is operating within prescribed limits for accuracy and precision. With the exception of blanks, the concentration of these quality control samples is known prior to analysis. Types of Quality Control Samples are presented in Table 5. Duplicates and spiked duplicates are selected at random, and when not specified are rotated among clients.

4.5.3 External Quality Control Samples-Proficiency Testing

TriMatrix Laboratories receive Performance Testing (PT) samples on a scheduled basis from state and federal regulatory agencies as well as certain client organizations. A summary of these PE samples is given below:

PT Program	Sample Type	Source	Frequency
WS	Drinking Water	ERA	Semi-Annual
WP	Waste/Ground Water	ERA	Semi-Annual
Soil	Soil	ERA	Semi-Annual
Varies	Environmental	State/Federal Programs	Varies
Varies	Environmental	Client	Varies

TriMatrix receives written reports from sponsoring agencies grading not only their performance, but also a comparison to other laboratories participating in the study. This provides feedback to laboratory personnel regarding the satisfactory use of analytical methods and equipment. Additionally, results from all single and double blind PT samples are used as part of the laboratory's fraud prevention and detection program.

NOTE: Non-conformances associated with failing PT samples are required by certain state, federal, and other applicable regulatory agencies. They must be distributed to those agencies within the time frame they have established.

4.6 DATA ASSESSMENT PROCEDURES

4.6.1 Precision

Precision of laboratory analyses will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analyses, and laboratory duplicate or MSDs for inorganic analyses. The relative percent difference (RPD) will be calculated for each pair of duplicate analyses using the following equation:

$$\%RPD = \left(\frac{S - D}{\frac{S + D}{2}} \right) \times 100$$

where:

S = first sample value (original of MS value)

D = second sample value (duplicate or MSD value)

4.6.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, equipment blank, and trip blanks. The percent recovery (%R) of matrix spikes will be calculated using the equation below:

$$\%R = \left(\frac{A - B}{C} \right) \times 100$$

where:

A = the analyte concentration determined experimentally from the spiked sample

B = the background level determined by a separate analysis of the un-spiked sample

C = the amount of the spike added

4.6.3 Control Limits

Unless specified by the analytical method, all quality control acceptance limits in use at TriMatrix are derived from historical data, for each method, matrix, and QC type combination. Precision and accuracy control limits are calculated at a 99% confidence level (+/- three standard deviations); warning limits are calculated at a 95% confidence level, (+/- two standard deviations). Accuracy windows are calculated using the mean of the percent recoveries. Precision windows are calculated as specified in SW-846, using the relative percent difference of the amounts found, not the percent recoveries.

4.6.4 Uncertainty

In addition to the precision and accuracy of a result, a value relating to confidence is available in the form of a measurement uncertainty estimate. The measurement uncertainty value is estimated using the QC-based nested approach and is calculated at the 95% confidence level. Uncertainty estimates are reported as "percent relative uncertainty."

4.6.5 Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated as follows:

$$\text{Completeness} = \left(\frac{\text{valid data obtained}}{\text{total data planned}} \right) \times 100$$

4.7 PROCEDURES FOR CORRECTIVE ACTION

When a non-conforming event or process deviation has occurred, corrective action is required. A written standard operating procedure (plan for corrective action) provides the steps for dealing with an out-of-control testing situation. The assessment of whether the process is out-of-control is based on predetermined limits for laboratory operations. Non-conformances based on statistical analysis or quality control samples are readily apparent and easy to identify. A process deviation, which does not have a directly observable impact on data quality, is more difficult to discern. Examples of the latter, subtler types of non-conformances include volatile samples not properly stored; oily layers in certain types of samples that may interfere with analysis; or a water-soaked sample label whose information is barely legible. Discovery of a non-conforming event or process deviation can result from the observations of a staff member, a review of laboratory data at any level, the result of an audit, or a client complaint. A corrective action investigation will be initiated within one week of the discovery of any non-conformance. The time frame required to resolve a specific deficiency and implement the corrective action is dependant on the magnitude of the problem and the defensibility and use of the data. Most non-conformances should be resolved within 60 days from the initiation date. Non-conformances that specifically impact sample results should be resolved within 14 days.

NOTE: The client must be contacted within 48 hours (2 business days) upon the discovery of any event that may cast doubt on the validity of a sample result.

The overall scheme of a corrective action plan can be outlined as follows:

1. Define the problem and evaluate the significance of the non-conformance;
2. Assign responsibility for evaluating the problem and determine if the client should be notified and/or work recalled;
3. Determine thorough investigation of all the pertinent facts what the probable cause of the problem is;
4. Select and implement the action(s) most likely to eliminate the problem and prevent recurrence;
5. Assign responsibility for carrying out the corrective steps and implement the action;
6. Follow-up to ensure that the problem has been eliminated and when necessary authorize the resumption of work.

Specific responsibility for implementing corrective action is as follows:

It is the responsibility of the analyst or other employee who observes a non-conforming event to:

- Identify and define the problem.
- Report the problem promptly to the area manager.
- Fill out a Non-Conformance Investigation Report (refer to Appendix AL).
- When applicable, investigate and attempt to determine the cause of the problem.
- When applicable, accept responsibility for implementing the corrective action approved by the area manager.
- When applicable, evaluate the effectiveness of the corrective action.
- When applicable, verify that the corrective action has eliminated the problem.

It is the responsibility of the laboratory area manager to:

- Review the problem and the proposed corrective action.
- If the reporting person does not have a remedy, work together with the person to determine a satisfactory solution.
- Assign the final corrective action steps to be performed.

It is the responsibility of the QA Department to:

- Follow-up to ensure that the problem has been eliminated and when necessary authorize the resumption of work.
- Review, sign, and categorize every Non-Conformance Investigation Report.
- Randomly review corrective action documentation in laboratory through internal audits to ensure that adequate records are being kept.

The ultimate goal of every non-conformance investigation is to resolve the error through identification of the error's root cause. Ideally, once the source of error is found, change can be implemented to prevent reoccurrence of the same error thereby providing a system of continuous quality improvement.

Non-conformances can originate from anyone in the laboratory. Provide the QA department with a copy of the initial report at the time of its distribution, followed by a

copy of the completed report. The final report will be distributed to all necessary personnel. Initiation of non-conformance reports associated with out-of-control PT samples will commence with the QA department. The initial non-conformance will be typed up and may include attachments such as a graph charting the history of PT results for that analyte. The history of results for that analyte in PT studies will also be reviewed through the database, looking at additional items such as method, matrix, analyst, vendor, and study type (WP, WS, etc.).

NOTE: Non-conformances associated with PT samples must be completed and distributed to state, federal, and other applicable regulatory agencies within the time frame established by that agency.

Returned non-conformance reports will be typed and the final report may include copies of raw data, information concerning traceability, graphs charting historical data, graphs charting trends in analysis, calibration graphs, or any other information relevant to the investigation.

When investigating a failing PT sample, a questionable analytical result, or a client complaint, the following systematic approach for error analysis should be followed until the primary source of error is located and resolved. Progress through them in the order they are presented below (easy to determine transcription error through difficult to determine analytical/procedural failure).

1. Consolidate all necessary raw information, run data and associated calibration and quality control data for both the reported and any non-reported analyses of that sample.
2. Confirm that the intended result was the reported result (transcription error).
3. Verify that the sample was prepped correctly.
4. Verify the correct analytical and pre-treatment method was used.
5. Double check all manual calculations, looking for incorrectly calculated results, missing dilution factor, wrong initial and final volumes, etc. Where possible manually calculate the result and compare with the reported result.
6. Compare the age of the calibration to the PT analysis date.
7. Review data associated with all quality control samples for biases. Also evaluate all QC solutions with respect to age, source, storage, and handling.

8. Determine the reasonableness of the data. Verify that all QC parameters were in control. Compare results to established limits to the data quality objectives of the study (i.e. tighter QC required for WS studies).
9. Review standard laboratory techniques used on the sample and all associated QC analyses. Were measurements used in quantitation made volumetrically? Were pipets and volumetric flasks used, or were less stringent techniques employed? Were serial dilutions made during the preparation of the curve?
10. Review analytical conditions, integration, background corrections, analyte resolution, and any confirmation runs.
11. Review calibration ranges. Are they too large for the analysis? An over extended calibration range will appear S-shaped. Check the population of curve points in the area of the analyte concentration.
12. Review calibration type (linear, average, response factor, polynomial non-linear, etc.). Reprocess multi-level curve data through a best fit program and if linear, perform a residuals analysis to identify outlier calibration points. If the result was quantitated using an average response factor, compare with the best-fit information and confirm justification for use of the average response factor quantitation.

In general, there are three major areas where corrective action is required. These categories are described below. Non-Conformance Reports are required on indications flagged with a *. Other indications may require a Non-Conformance Report based on the circumstances.

4.7.1 Quality Control Failures

These are usually handled within the laboratory by the analyst.

Indications of Non-Conformance

- Blanks, laboratory control, or spiked samples contain contamination greater than acceptable levels.
- Suspicious trends in spike recoveries or relative percent differences (RPD) between duplicates.
- Initial instrument blank, initial calibration standards, QC check standards, continuing calibration standard spikes, or method blanks are outside acceptance criteria.

- The method blank or instrument blank analysis exceeds the detection limit for the analyte.

Recommended Corrective Action

- Prepare another instrument blank. If the response is still greater than the reporting limit, look for sources of contamination in reagents, the laboratory working environment, and the instrument.
- Reanalyze standard. If results are still unacceptable, prepare new standards. If necessary obtain new primary standards.
- Reanalyze continuing calibration standard. If necessary, recalibrate and reanalyze samples since last successful continuing calibration.
- Evaluate preparation of spikes, spiking techniques, spiking equipment and materials.

4.7.2 Procedural Failures

These are usually handled by the laboratory area manager and the quality assurance department.

Indications of Non-Conformance

- There are unusual changes in detection limits.
- Statistical quality control data is demonstrating unacceptable trends or is outside the warning or acceptance limits.
- Deficiencies are evidenced on performance evaluation samples or internal or external audits.
- Clients express concern about the quality of their data.

Recommended Corrective Action

- Review the method with the analyst.
- Reanalyze the samples and evaluate the results.
- Recalibrate the instrument or analysis method with freshly prepared standards and reanalyze the samples.
- Re-extract and reanalyze the samples per the method.
- Evaluate the data and sample behavior and investigate any possible chemical interferences.

- Re-run the samples using the method of standard additions.
- Check the instrument for possible maintenance deficiencies.
- Seek additional help from other analysts or provide additional training for personnel involved.
- Perform a system audit to evaluate corrective action measures.

4.7.3 Test Specification Failures

These are usually handled by the analyst, laboratory area manager, and the quality assurance department.

Indications of Non-Conformance

- Quality control check standard data is outside the acceptance limits defined for that analyte.

Recommended Corrective Action

- Review the method with the analyst.
- Reanalyze the check standard and evaluate the results.
- Prepare fresh check standard or new primary standard.
- Recalibrate the instrument or analysis method.
- Switch to a different standard vendor.
- Investigate possible chemical interferences.
- Check the instrument for possible maintenance deficiencies.
- Retrain the analyst.

4.7.4 Customer Complaints

The Quality Assurance Department coordinates with the client services staff to receive quality feedback from clients. It is the responsibility of the QA department to communicate any customer complaints to the laboratory operating areas and to follow-up on corrective action taken to prevent a recurrence.

4.8 PROCEDURES FOR PREVENTIVE ACTION

Changes and enhancements to existing policies and procedures are not always made based on the result of failing analytical performance or other non-conformances.

Borderline performance, equipment changes/modernization, or outdated internal procedures are all areas that may require modification or enhancement. Employees are encouraged to analyze internal procedures of all kinds, and offer suggestions for improvement. A Preventive Action Investigation form exists for this purpose (Appendix AM). The form is used to record a description of the existing procedure and a proposed solution, an action plan and systematic implementation schedule, and a follow-up section to monitor the effectiveness of any resulting changes.

All Preventive Action Investigations are loaded into a database similar to that used to track non-conformances.

4.9 DEPARTURE FROM DOCUMENTED PROCEDURES

4.9.1 Management Policies

Any departure from a laboratory written standard operating procedure not directly involving sample analysis or processing must be approved by the area manager. The area manager must file a Non-Conformance Investigation Report. The Non-Conformance Investigation Report must be included as part of the data package.

Any departure from a SOP involving sample processing or sample analysis must be justified in writing by the analyst and laboratory area manager. The prior written approval of the laboratory president must be received before performing the analysis. The laboratory president must also file a Non-Conformance Investigation Report. This Non-Conformance Investigation Report must be included as part of the data package.

4.9.2 Method Modification and Variances

Unauthorized modification of, and variances in, analytical methods, except for the deviations justified in writing and approved per section 4.9.1 are strictly prohibited. Modifications to approved procedures must go through the formal approval and documentation process. Posting unauthorized hand edits to approved methods or procedures, or posting other forms of unauthorized procedural instructions in the work area is not acceptable. All such postings

must have prior managerial approval. Modifications must be incorporated into the next version of the SOP.

4.10 PERFORMANCE AND SYSTEM AUDITS

4.10.1 Internal Audits

Each January an internal audit schedule will be created. Over the course of the year the Quality Assurance Department will audit the laboratory to verify compliance with ISO-17025 and various State and Federal requirements.

4.10.2 External Audits

Audits of the laboratory conducted by regulatory agencies and client representatives are to be perceived by the laboratory staff as learning experiences and opportunities to hear suggestions from knowledgeable persons on how operations might be improved. Consequently, the laboratory staff is to be open and cooperative with external auditors.

4.10.3 Quality Assurance Reports to Management

A formal written follow-up will be conducted after every internal audit to verify that any deficiencies cited have been corrected, and that the corrective actions have been successful. Non-conformances will be documented using the Non-Conformance Investigation Report. The Quality Assurance Department will provide copies of all to the laboratory president. Copies of all external audit reports will also be provided to the laboratory president.

4.10.4 Client Notification

If during the course of an audit, problems were uncovered that may have impacted the laboratory's ability to generate quality data, written notification will be provided to all impacted clients. Impacted clients include those clients who received results from samples analyzed during the time frame the problem existed. Revised data reports will be issued as necessary.

NOTE: The client must be contacted within 48 hours (2 business days) upon the discovery of any event that may cast doubt on the validity of a sample result.

Figure 4-1

Documentation System Structure

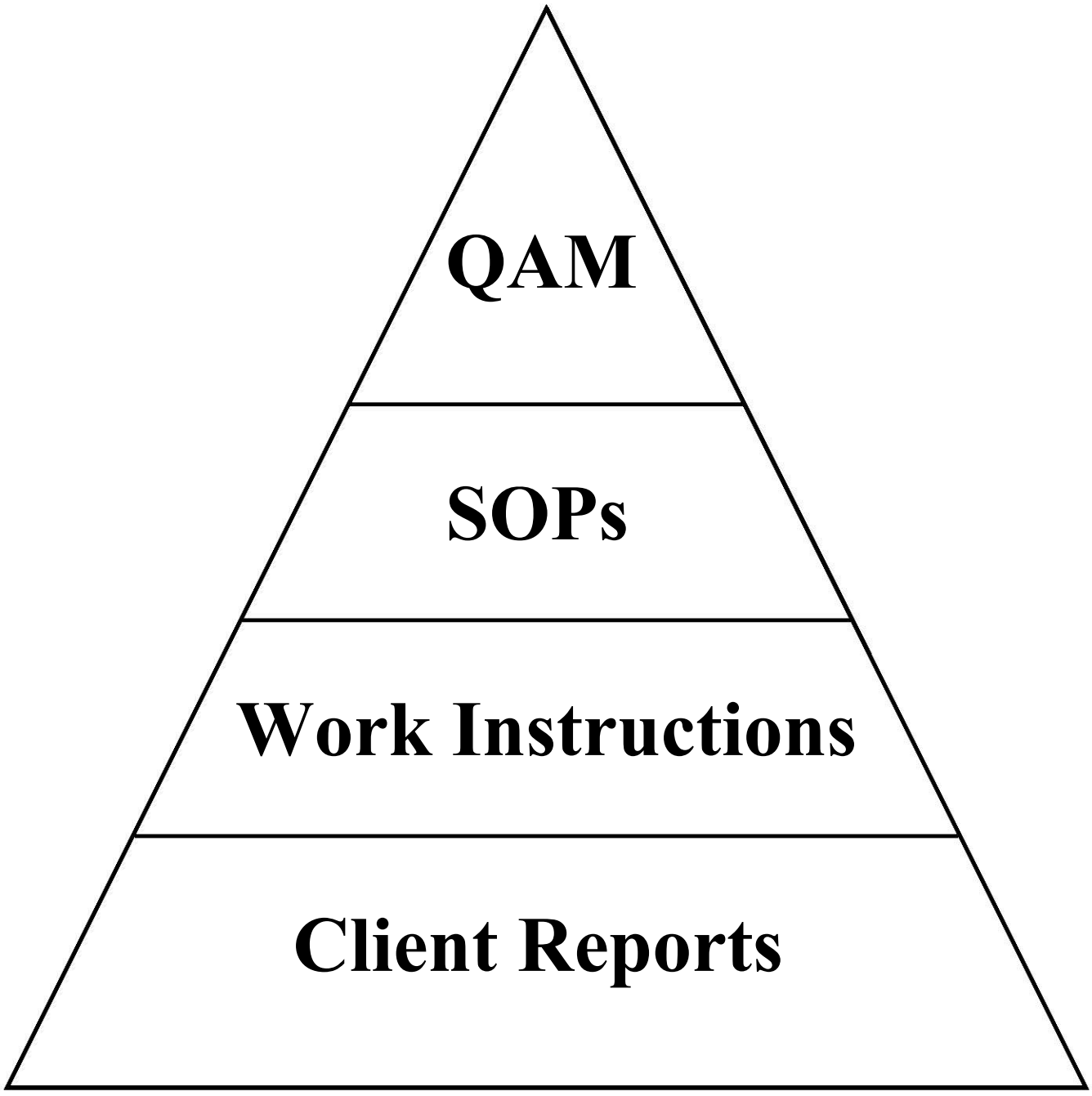


Figure 4-2

Benchsheet/Client Report

Flow Diagram

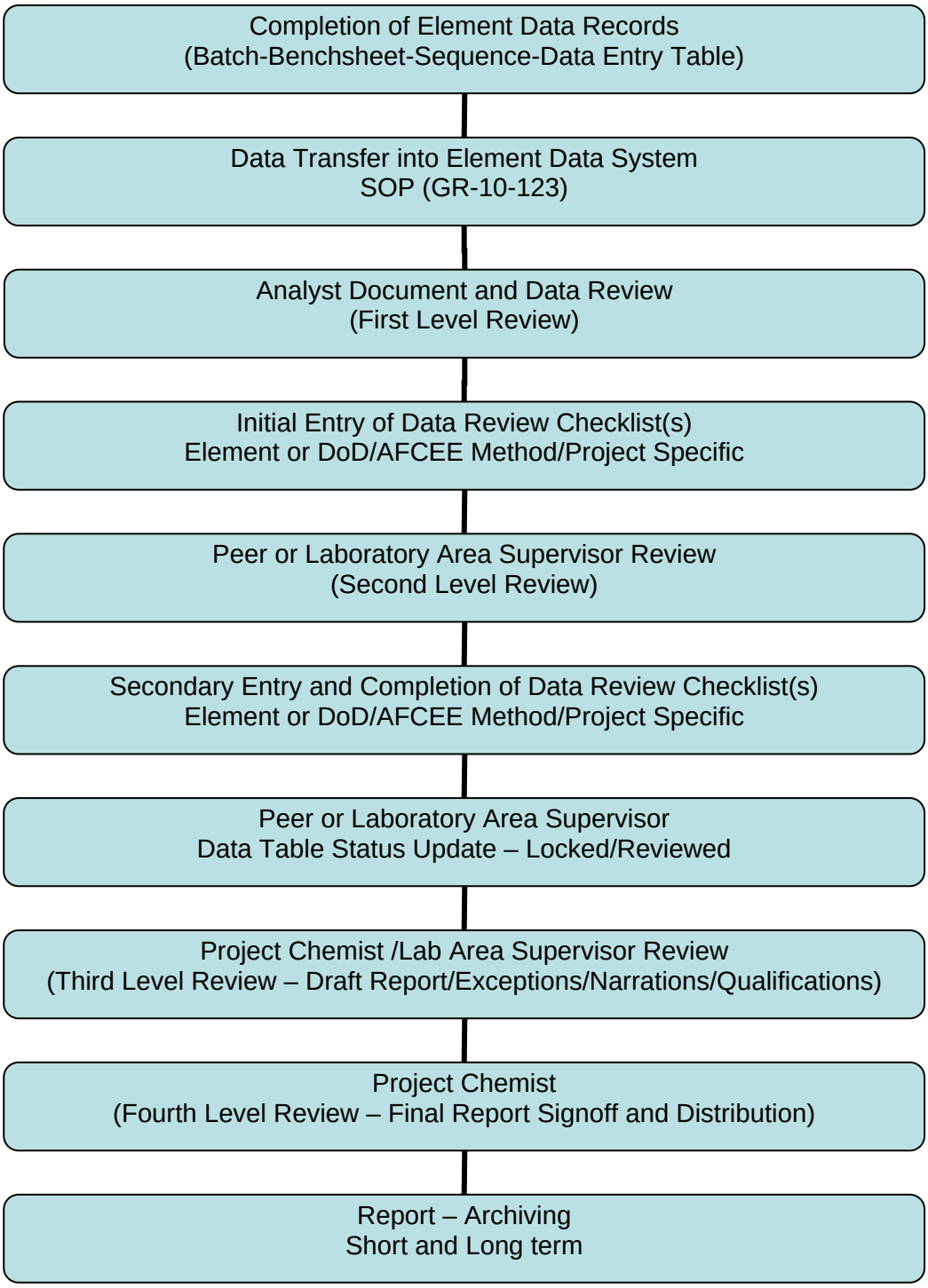
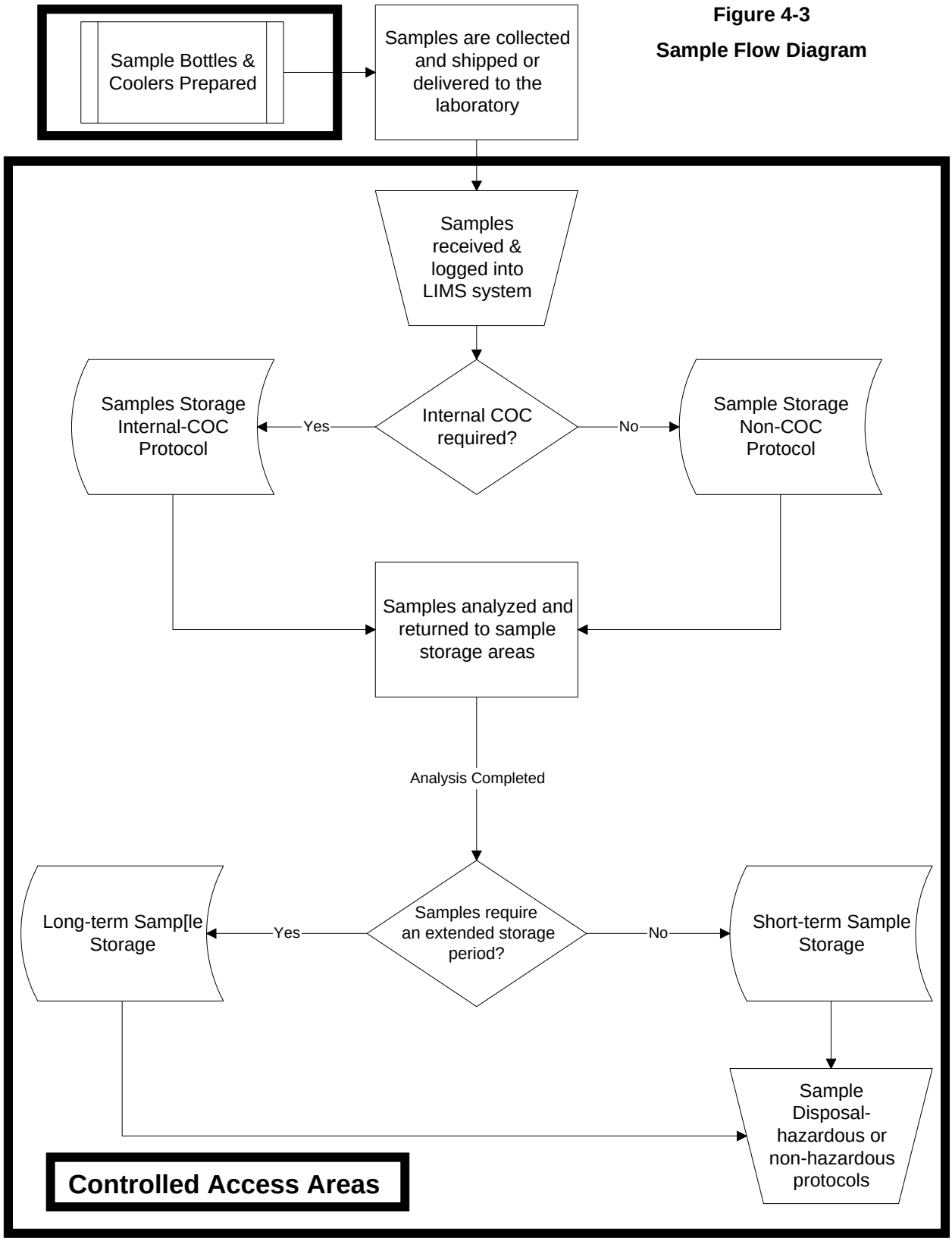


Figure 4-3

Sample Flow Diagram



5.0 REFERENCES

- Methods for Chemical Analysis of Water and Wastes; EPA-600/4-79-020 most current revision.
- Standard Methods for the Evaluation of Water and Wastewater; Current Edition, APHA, AWWA, WPCF.
- Handbook for Analytical Quality Assurance in Water and Wastewater Laboratories; EPA 600/4-79-019, most current revision.
- Physical and Chemical Methods for the Evaluation of Solid Waste; EPA-SW-846, most current revision.
- Guidelines Establishing Text Procedures for the Analysis of Pollutants; 40 CFR; Parts 100 to 149, Current Edition.
- Good Automated Laboratory Practices; USEPA Office of Administration and Resource Management, most current revision.

TABLE 1
Default Data Archiving Systems

Document Archives

Document Description	Storage Location	Storage Duration
Laboratory benchsheets	on-site	1 year
Laboratory benchsheets	off-site	6 years
Instrument Print-Outs (raw data)	on-site	1 year
Instrument Print-Outs (raw data)	off-site	6 years
Laboratory Logs (run, maintenance, analyst)	on-site	1 year
Laboratory Logs (run, maintenance, analyst)	off-site	6 years
Client Files (reports, correspondence, invoices)	on-site	1 year
Client Files (reports, correspondence, invoices)	off-site	6 years
Proposal Files	on-site	5 years
Purchase Agreements	on-site	5 years
SOPs	on-site	5 years

Electronic Archives

File Description	Storage Location	Storage Duration	Storage Media
Instrument Data Files-GC/MS	on-site	1 year	Compact Disk
Instrument Data Files-GC/MS (copy)	off-site	10 years	Compact Disk
Instrument Data files-GC (Turbochrom)	on-site	1 year	Compact Disk
Instrument Data files-GC (Turbochrom) (copy)	off-site	10 years	Compact Disk
Instrument Data files-AA, ICP, ICP/MS	on-site	1 year	Compact Disk
Instrument Data files-AA, ICP, ICP/MS (copy)	off-site	10 years	Compact Disk
Instrument Data files-Auto Analyzer	on-site	1 year	Compact Disk
Instrument Data files-Auto Analyzer (copy)	off-site	10 years	Compact Disk
LIMS daily backup	on-site fire-safe	30 day rotation	DAT-Tape
SOPs	on-site	indefinitely	Compact Disk

TABLE 2
Laboratory SOP Categories

Trace Metals
Gas Chromatograph
Spectrophotometric Procedures
Gravimetric Procedures
Extractions-Organic
Sales and Customer Service
Laboratory Computer Operations
Sample Receiving, Storage, & Disposal
Bottle Prep
Microbiology
Waste Characterization
Instrumental-General
Gas Chromatography/Mass Spectroscopy
Titrimetric Procedures
Electrochemical/Potentiometric Procedures
Quality Assurance
Business and Accounting
Laboratory Safety and Security
Miscellaneous
Inorganic-General

TABLE 3
Field Equipment Calibration

Equipment	Method Reference	Minimum # Standards Initial Calibration	Type of Curve	Frequency of Calibration	Acceptance/ Rejection Criteria Initial Calibration	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
Conductivity Meter	SW-846 Method 9050	2	---	Initial	± 5% of Value	Daily	---
Dissolved Oxygen Meter	Standard Method 4500-O G.	---	---	Initial	± 5% of Value	Daily	---
Temperature Probes	Standard Method 2550 B.	---	---	Initial	± 5% of Value	Daily	---
pH Meter	SW-846 Method 9040	3	Linearity	Initial	Adjust slope to within ±0.05 pH units accuracy	Daily	---

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Second Source Calibration Verification	Acceptance/ Rejection Criteria Second Source Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
Mercury Cold Vapor AA	SW-846 7470/7471 EPA 245.1	5	Correlation coefficient must be ≥0.995	Daily, at the beginning of every analytical batch, and when CCV fails acceptance criteria	Every calibration	90-110% recovery 95-105% recovery	Every 10 samples	90-110% recovery 90-110% recovery
ICP	SW-846 6010 EPA 200.7	3	same as above	same as above	same as above	95-105% recovery	same as above	90-110% recovery
ICP/MS	SW-846 6020 EPA 200.8	5	same as above	same as above	same as above	90-110% recovery	same as above	90-110% recovery
Ion Chromatograph	SW-846 9056 EPA 300.1	6	Correlation coefficient must be ≥0.995	Every month or when CCV fails	Every calibration	90-110% recovery	Every 10 samples	90-110% recovery
Sulfate Chloride	ASTM D516-90, 9038 4500-Cl E, 9251	6 Low range 8 High range	same as above	Daily	same as above	85-115% recovery 90-110% recovery	Every 10 samples (sulfate every 4 samples)	85-115% recovery
Phenolics (Total)	SW-846 9065 EPA 420.4	7-8	same as above	Daily	same as above	90-110% recovery	Every 10 samples	90-110% recovery

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Second Source Calibration Verification	Acceptance/ Rejection Criteria Second Source Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
Cyanide Total Cyanide Amenable	SW-846 9014, 4500-CN E 4500-CN G	7	same as above	Daily	1 High / 1 Low every calibration	90-110% recovery	Every 10 samples	90-110% recovery
TOC	5310 C, 9060	6 Low range 7 High range	same as above	Every 6 months or until SCV failure	Daily	90-110% recovery	Every 10 samples	85-115% recovery
GC-PID/ ELCD	SW-846 8021	5 for linear 6 for quadratic	≤20% RSD use average RF or regression, >20% must use regression	As needed, when CCV >20% expected response or concentration	As needed, with analysis of each curve	75-125% recovery	Before and after every 10 samples and at end of each analytical batch	±20% expected response or concentration; ±20% for compounds that boil below 30° C (Bromomethane, chloroethane, chloromethane, dichlorodifluoromethane, trichlorofluoromethane, and vinyl chloride
	EPA 601/602	3	<10% RSD use average RF or regression, ≥10% must use regression	As needed when CCV fails method Table 2 criteria				Method Table 2 criteria

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Second Source Calibration Verification	Acceptance/ Rejection Criteria Second Source Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
GC-FID	SW-846 8015	5 for linear 6 for quadratic	≤20% RSD use average CF or regression, >20% must use regression	As needed, when CCV >20% expected response or concentration	As needed, with analysis of each curve	75-125% recovery	Before and after every 10 samples and at end of each analytical batch	±20% expected response or concentration
GC-ECD	SW-846 8081 SW-846 8151 SW-846 8082 SW-846 8121 EPA 608 EPA 612	5 for linear 6 for quadratic 3	≤20% RSD use average CF or regression, >20% must use regression <10% RSD use average CF or regression, ≥10% must use regression	As needed, when CCV > 20% 20% 15% 15% 15% 15% expected response or concentration	As needed, with analysis of each curve	75-125% recovery	Before and after every 10 samples and at end of each analytical batch	Amount found ± 20% 20% 15% 15% 15% 15% expected response or concentration
GC-HPLC	SW-846 8310	5 for linear 6 for quadratic	≤20% RSD use average CF or regression, >20% must use regression	As needed, when CCV >15% expected response or concentration	As needed, with analysis of each curve	80-120% recovery	Before and after every 10 samples and at end of each analytical batch	±15% expected response or concentration

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Second Source Calibration Verification	Acceptance/ Rejection Criteria Second Source Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
GC/MS-Volatiles	SW-846 8260	5 for linear 6 for quadratic	CCCs – %RSD ≤30% 1,1-dichloroethene, chloroform, 1,2-dichloropropane, toluene ethyl benzene, vinyl chloride, all other target analytes ≤15% use average RF for quantitation, otherwise regression SPCCs – average RF ≥ 0.10 for chloromethane, 1,1-dichloroethane and bromoform; ≥ 0.30 for 1,1,2,2-tetrachloroethene and chlorobenzene	As needed, when CCV fails	As needed, with analysis of each curve	75-125% recovery	12 hours	8260: CCCs – % Difference or drift ≤20%, all other target analytes within 20% expected value, high recovery acceptable when analyte not present in sample; SPCCs same criteria as initial calibration
	EPA 624	3	<35% RSD for all compounds use average RF, otherwise use regression				24 hours	Recovery of all analytes must meet recoveries specified in method

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Second Source Calibration Verification	Acceptance/ Rejection Criteria Second Source Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
GC/MS-Semi-volatiles	SW-846-8270	5 for linear 6 for quadratic	CCCs – %RSD ≤30% acenaphthene, 1,4-dichlorobenzene, hexachlorobutadiene, N-nitroso-diphenylamine, di-n-octylphthalate, fluoranthene, benzo(a)pyrene, 4-chloro-3-methylphenol, 2,4-dichlorophenol, 2-nitrophenol, phenol, pentachlorophenol, 2,4,6-trichlorophenol, all other target analytes ≤15% use average RF for quantitation, otherwise regression SPCCs – average RF ≥0.05 N-nitrosodi-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol	As needed, when CCV fails	As needed, with analysis of each curve	75-125% recovery	12 hours	8270: CCCs ≤20% difference or drift; 60-140% for: Benzidine 3,3—Dichlorobenzidine 2,4-Dinitrophenol 4-Nitrophenol All other target analytes within 25% expected value. High recovery acceptable when analyte not present in sample. SPCCs same criteria as initial calibration
	EPA 625	3	<35% RSD for all compounds to use average RF, otherwise regression				24 hours	80-120% recovery

TABLE 5
Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Method Preparation Blank	MPB	This blank has been carried through the entire analytical process including any pretreatment procedures. The MPB will monitor any contaminants that may affect the sample results. General acceptance limits for the MPB are less than the test reporting Limit. If contamination is detected in the MPB above the reporting limit, all samples with analyte concentrations within 10x that found in the MPB must be flagged for re-extraction or digestion. If it is not possible to re-prep the samples then all analyses for that batch must be qualified.	One per analytical batch

TABLE 5
Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Continuing Calibration Blank	CCB	The continuing calibration blank is a reagent blank that is analyzed as a sample, generally after 10 samples have been tested. The CCB must be run prior to re-zeroing an instrument, unless this practice was performed for each previous sample. The CCB will verify whether significant instrument drift has occurred during the analytical run near the test method detection limit. General acceptance limits are ± the test reporting limit. If the CCB falls outside the acceptance limits, the instrument must be recalibrated and the previous 10 samples reanalyzed. For automated tests where run data is generated after all analyses are completed, 10 samples before and after the unacceptable CCB must be reanalyzed, i.e., all sample results must be encased in acceptable CCB. The reanalysis must also include the ICB and ICV QC samples.	Every ten samples/or as specified in the analytical method.

TABLE 5
Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Field Trip Blank	FTB	These are used with VOA vials where there is the possibility that organic contaminants may diffuse through the PTFE-faced silicone rubber septum of the sample vial. A field trip blank vial filled with organic-free water accompanies the sample containers to and from a client location, at the discretion of the client, may be analyzed along with the samples.	One per sample shipping container
Storage Blank	STB	Reagent-grade water (40 mL aliquot) is stored with samples in a client set. Per the discretion of the client, it may be analyzed after all samples in that set are analyzed. The purpose is to determine the level of contamination acquired during storage.	One per sample storage refrigerator or client sample set (if required)

TABLE 5
Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Laboratory Fortified Blank or Blank Spike	LFB or BS	This is a fortified method preparation blank in which an aliquot of de-ionized water has been spiked with a known amount of a stock reference standard or spiking solution. A blank spike is required for each digestion or distillation batch. The purpose of the blank spike is to verify the analyst's spiking procedure and assure that any matrix interference shown by the spike and spike duplicate is really matrix induced.	One per analytical batch or as specified in the analytical method

TABLE 5
Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Second-Source Calibration Verification	SCV	The SCV is identical to the CCV with the exception it must be made from a source dissimilar to that used to prepare the initial calibration curve. The purpose of the SCV is to validate the accuracy both the calibration standards, and the initial calibration curve. Unless otherwise specified by the method, recovery limits for this QC type are typically 80-120%. Sample analysis may not begin prior to the analysis of a successful SCV.	One with every initial calibration

TABLE 5
Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Continuing Calibration Verification	CCV	The continuing calibration verification standard is generally the standard used as the midpoint of the initial calibration curve. The standard is analyzed and quantitated in the in the same manner as a sample. The CCV will reveal any significant instrument drift. Acceptance limits for this QC type are ± 10%, or as stated in the method. If the CCV falls outside the acceptance window, the instrument must be recalibrated and the previous 10 samples reanalyzed. For automated tests where run data is generated after all analysis is complete, all samples run after the last acceptable CCV must be reanalyzed, i.e. all samples must be bracketed by an acceptable CCV.	Every 10 samples or as specified in the analytical method

TABLE 5
Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Detection Limit	CRDL	A standard which contains the minimum level of detection acceptable under a contract Statement of Work must be analyzed for particular contract sample sets to demonstrate that detection limit can be met.	One per analytical batch for certain contract sample sets and methods only.
Sample Duplicate	DUP	The sample duplicate is a replicate analysis of a particular sample that has been analyzed previously during the sample analytical batch. The purpose of the duplicate is to monitor precision within the analytical process.	Every 10 samples for each matrix type

TABLE 5
Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Sample Matrix Spike	SPK	The sample matrix spike is an aliquot of a sample that has been spiked with a known amount of a stock reference standard or spiking solution. A the purpose of the SPK is to monitor sample matrix effects on the test. Acceptance limits for this QC type are based on the 95% confidence limits established for a test and matrix.	Every 10 samples for each matrix type, or as specified in the analytical method

TABLE 5
Quality Control Sample Types

Matrix QC Type	Abbreviation	Description	Frequency of Use
Matrix Spike Duplicate	MSD	A matrix spike duplicate is an aliquot of the same sample used for the matrix spike (SPK). A spike duplicate is required for each matrix type within a digestion or distillation batch. A spike duplicate analysis may be required on a non-distilled or non-digested sample if the spike has indicated a matrix interference. The purpose of this duplicate spike is to confirm any matrix effects on the test. Acceptance limits for this QC type are based on the 95% confidence limits established for a test and matrix.	Every 10 samples for each matrix type or as specified in the analytical method

TABLE 5
Quality Control Sample Types

Matrix QC Type	Abbreviation	Description	Frequency of Use
Field Duplicate	FDUP	This may be required to evaluate the uniformity of samples and sampling techniques at a field location. Acceptance limits for this QC type are based on established confidence limits, with generally two levels or ranges. The first range extends from the test reporting limit to 10x the test reporting limit. The second range encompasses any values higher than 10x the MDL.	As required on a project basis
Post-Digestion Spike	PDS	The post-digestion spike may be required, on a project basis, when a matrix precludes the use of pre-digestion spike.	One per analytical batch when required by project

TABLE 5
Quality Control Sample Types

Matrix QC Type	Abbreviation	Description	Frequency of Use
Surrogate Spike	SUR	For almost all organic analyses, the analytical method requires surrogate compounds to be added to every blank, sample, matrix spike, matrix spike duplicate, and standard. Surrogate compounds are used to measure analytical efficiency by measuring percent recovery from the known value. They are generally brominated, fluorinated, or isotopically labeled compounds not typically detected in environmental samples.	Every QC and per batch for semi-volatile, volatile, pesticide, PCB analysis
Internal Standard	IST	These are compounds added to every standard, blank, matrix spike, matrix spike duplicate, sample (for volatiles), at a known concentration, prior to analysis. Internal standards are used as the basis of quantitation of the target compounds.	Every QC and client sample per batch for volatiles and semi-volatiles

Appendix A

CHEMIST I

General Description

Under direct supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties.

Educational/Background Requirements

- Associates degree and 3 or more years of experience in an environmental or related laboratory setting; or
- BS degree in Chemistry or a related field of science.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist I.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Perform all other activities deemed necessary to management.

CHEMIST II

General Description

Under ***general*** supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties.

Educational/Background Requirements

- Associates degree and ***5*** or more years of experience in an ***applicable discipline***; or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline***; or
- ***MS degree in Chemistry or a related field of science***.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist II.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- ***Assist other chemists and technicians with their professional development***.
- ***Act as company advocate by setting a positive example in work habits and attitude to other staff members***.
- ***Demonstrate ability to work independently with minimal errors***.
- ***Capable of conducting peer review on routine data packages***.

- ***Possess the minimum level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements***.

- Perform all other activities deemed necessary to management.

CHEMIST III

General Description

Under ***minimal*** supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- Associates degree and ***7 or more years of experience in an applicable discipline***; or
- BS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist III.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine/***non-routine*** maintenance ***and troubleshooting*** of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development.
- Act as company advocate by setting a positive example in work habits and attitude to other staff members.
- Demonstrate ***increased*** ability to work independently with minimal errors.

- Capable of conducting peer review on routine ***and non-routine*** data packages. ***Has demonstrated knowledge to perform final data review and approval on LIMS.***

- Possess ***an above average*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.

- ***Assist in the development and maintenance of laboratory SOPs.***

- Perform all other activities deemed necessary to management.

CHEMIST IV

General Description

Under minimal supervision of the area manager and***/or the technical director***, conducts ***complex*** analyses on samples to determine their chemical and/or physical properties. Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***10*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***7*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- ***Ph.D. in Chemistry or a related field of science and experience in an environmental or related laboratory setting***.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist IV.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation ***of, and assisting other chemists in***, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development ***and in the integration of new methods and technologies***.

- Act as company advocate by setting a positive example in work habits and attitude to other staff members, ***prospective employees, existing and perspective clientele, and the general public***.
- Demonstrate ***superior*** ability to work independently with minimal errors.
- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.
- Possess ***a superior*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.***
- ***When appropriate, work with the technical director to develop new methods and technologies***.
- ***Develop, review, and update laboratory SOPs as necessary***.
- Perform all other activities deemed necessary to management.

CHEMIST V

General Description

Under minimal supervision of the area manager and/or the technical director, conducts complex analyses on samples to determine their chemical and/or physical properties. Eligible for consideration of group leader status. ***May work directly with the technical director to develop new methods and technologies for the laboratory***.

Educational/Background Requirements

- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***2 or more years of*** experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist V.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, assisting other chemists in, ***and serving as the primary reference for***, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development and in the integration of new methods and technologies.

- Act as company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.
- Demonstrate superior ability to work independently with minimal errors.
- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.
- ***Responsible for the study and implementation of*** new methods and technologies.
- Develop, review, and update existing laboratory SOPs as necessary, ***write new SOPs as required to reflect advancements in methods and technologies***.
- ***Work with management team to plan for future equipment acquisitions***.
- ***Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions***.
- Perform all other activities deemed necessary to management.

SENIOR CHEMIST

General Description

Working independently or under minimal supervision of, ***an*** area manager, technical director, ***or the laboratory president***, conducts ***or supervises analysis of complex non-routine projects*** to determine their chemical and/or physical properties. Eligible for consideration of group leader status.

Educational/Background Requirements

- BS degree in Chemistry or a related field of science and ***15*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***7*** or more years of experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Chemist.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, assisting other chemists in, and serving as the primary reference for, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development and in the integration of new methods and technologies.
- Act as company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.
- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.
- Responsible for the study and implementation of new methods and technologies.
- Develop, review, and update existing laboratory SOPs as necessary, write new SOPs as required to reflect advancements in methods and technologies.
- Work with management team to plan for future equipment acquisitions.
- Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.
- Perform all other activities deemed necessary to management.

GROUP LEADER

General Description

In addition to the duties associated with the current chemist level, a group leader also takes on administrative responsibilities involved with the operation of the laboratory area.

Educational/Background Requirements

- Minimum of those specified with a Chemist III.

Minimum Required Skills and Responsibilities

Consistent with current Chemist Level, with additional or increased emphasis on the following requirements.

- Act as the area manager when the area manager is absent, filling such duties as supervision of employees and review and approval of data.
- Act as an additional source of information for management and others regarding laboratory area analysis capabilities.
- Responsible for the scheduling of work and the monitoring of workload for such items as hold times and due dates.
- Provide leadership, guidance, and training to other laboratory personnel on methods, equipment, and quality control.
- Develop, review and update laboratory SOPs as necessary.
- Assure that new methods, policies, and procedures are integrated into the laboratory area.
- Assume a primary responsibility for verifying that sample analyses are adhering to all method and laboratory specified quality assurance parameters.

PROJECT CHEMIST I

General Description

Under direct supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs.

Educational/Background Requirements

- Associates degree and 3 or more years of experience in an environmental or related laboratory setting; or
- BS degree in Chemistry or a related field of science.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist I.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare proposal outlines for existing clients.
- Perform all other activities deemed necessary to management.

PROJECT CHEMIST II

General Description

Under ***general*** supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs.

Educational/Background Requirements

- Associates degree and ***5*** or more years of experience in an ***applicable discipline;*** or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline;*** or
- ***MS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist II.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare proposal outlines for existing ***and new*** clients.
- ***Assist other project chemists and technicians with their professional development.***
- ***Act as a company advocate by setting a positive example in work habits and attitude to other staff members.***
- ***Demonstrate ability to work independently with minimal errors.***

- ***Posses the minimum level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.***

- Perform all other activities deemed necessary to management.

PROJECT CHEMIST III

General Description

Under ***minimal*** supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- Associates degree and ***7*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist III.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. ***Assist with the preparation, archiving, and delivery of a CLP or "CLP Like" deliverables package.***
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- ***Prepare and/or coordinate the preparation of proposals for existing and new clients under direct supervision of the client services manager, sales manager, or laboratory president.***
- Assist other project chemists and technicians with their professional development.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members.

- Demonstrate ***increased*** ability to work independently with minimal errors.
- Posses ***an above average*** level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in project workload and throughput.***
- ***Provide data interpretation services to clients.***
- ***Assist in the development and maintenance of laboratory SOPs.***
- Perform all other activities deemed necessary to management.

PROJECT CHEMIST IV

General Description

Under minimal supervision of the client services manager and/***or the sales manager,*** acts as the primary interface with the client to assure laboratory services are meeting client needs. ***May work directly with the sales manager to develop increased business from existing clients.*** Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***10*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***7*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- ***Ph.D. in Chemistry or a related field of science and experience in an environmental or related laboratory setting.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist IV.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, ***and assist other project chemists with,*** incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. ***Coordinate*** the preparation, archiving, and delivery of CLP or “CLP Like” deliverables packages.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare and/or coordinate the preparation of proposals for existing and new clients under ***minimum*** supervision of the client services manager, sales manager, or laboratory president.

- Assist other project chemists and technicians with their professional development ***and in the integration of new methods and technologies.***
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members***, prospective employees, existing and perspective clientele, and the general public.***
- Demonstrate ***superior*** ability to work independently with minimal errors.
- Posses ***a superior*** level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput ***as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or "CLP Like" deliverables package and/or managing projects to specifications outlines in QAPPs.***
- Provide data interpretation services to clients.
- ***Develop, review, and update laboratory SOPs as necessary.***
- ***When appropriate, work with sales manager to develop additional business from existing clients.***
- Perform all other activities deemed necessary to management.

PROJECT CHEMIST V

General Description

Under minimal supervision of the client services manager and/or the sales manager, acts as the primary interface with the client to assure laboratory services are meeting client needs. ***Works*** directly with the sales manager to ***establish relationships with new clients as well as increase*** business from existing clients. Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***2 or more years of*** experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist V.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, and assist other project chemists with, incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. Coordinate the preparation, archiving, and delivery of CLP or “CLP Like” deliverables packages.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare and/or coordinate the preparation of proposals for existing and new clients under minimum supervision of the client services manager, sales manager, or laboratory president. ***Take an active***

and substantial role on the marketing team in the development and coordination of large technical and cost proposals, qualifications packages, and marketing literature.

- Assist other project chemists and technicians with their professional development and ***serve as the primary reference for*** the integration of new methods and technologies.

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.

- Posses a superior level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or "CLP Like" deliverables package and/or managing projects to specifications outlines in QAPPs. ***Improve the productivity of others through training, assistance and the development and implementation of new, more efficient procedures.***

- Provide data interpretation services to clients. ***Assist clients in developing work plans or QAPPs by providing technical and administrative laboratory documentation and/or writing the laboratory portion of QAPPs.***

- Develop, review, and update laboratory SOPs as necessary. ***Write new SOPs as required to reflect advancements in procedures or technologies.***

- ***Routinely*** work with sales manager to develop additional business from existing clients ***and new clients.***

- ***Responsible for the study and implementation of new procedures and technologies.***

- ***Work with management team to plan for future equipment and software acquisitions.***

- ***Provide input to client services manager, sales manager, and/or laboratory president on personnel issues including performance reviews and staff additions / reductions.***

- Perform all other activities deemed necessary to management.

SENIOR PROJECT CHEMIST

General Description

Working independently or under minimal supervision of the client services manager and/or the sales manager***, or laboratory president,*** acts as the primary interface with the client to assure laboratory services are meeting client needs. Works directly with the sales manager to establish relationships with new clients as well as increase business from existing clients. ***Works directly with the laboratory president to develop the laboratory portion of QAPPs, work plans, and other technical documents.*** Eligible for consideration of group leader status.

Educational/Background Requirements

- BS degree in Chemistry or a related field of science and ***15*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***7*** or more years of experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Project Chemist.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, and assist other project chemists with, incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. Coordinate the preparation, archiving, and delivery of CLP or “CLP Like” deliverables packages.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare and/or coordinate the preparation of proposals for existing and new clients under minimum supervision of the client services manager, sales manager, or laboratory president. Take an active

and substantial role on the marketing team in the development and coordination of large technical and cost proposals, qualifications packages, and marketing literature.

- Assist other project chemists and technicians with their professional development and serve as the primary reference for the integration of new methods and technologies.

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.

- Posses a superior level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or “CLP Like” deliverables package and/or managing projects to specifications outlines in QAPPs. Improve the productivity of others through training, assistance and the development and implementation of new, more efficient procedures.

- Provide data interpretation services to clients. Assist clients in developing work plans or QAPPs by providing technical and administrative laboratory documentation and/or writing the laboratory portion of QAPPs.

- Develop, review, and update laboratory SOPs as necessary. Write new SOPs as required to reflect advancements in procedures or technologies.

- Routinely work with sales manager to develop additional business from existing clients and new clients.

- Responsible for the study and implementation of new procedures and technologies.

- Work with management team to plan for future equipment and software acquisitions.

- Provide input to client services manager, sales manager, and/or laboratory president on personnel issues including performance reviews and staff additions / reductions.

- Perform all other activities deemed necessary to management.

SENIOR TECHNICIAN

General Description

Working independently or under minimal supervision of***, an*** area manager, technical director, ***or the laboratory president,*** performs ***or supervises tasks related to complex non-routine projects*** necessary for efficient operation of the laboratory. Eligible for consideration of group leader status.

Educational/Background Requirements

- High school diploma or equivalent and ***15*** or more years of experience in an applicable discipline; or
- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or related field of science and ***7*** or more years of experience in an applicable discipline.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Technician.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, and assisting other technicians in, and serving as the primary reference for, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development and in the integration of new procedures and technologies.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and prospective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput, addition of new procedures/technologies and/or operation of additional equipment/instruments.
- Responsible for the study and implementation of new procedures and technologies.
- Develop, review, and update laboratory SOPs as necessary, write new SOPs as required to reflect advancement in procedures and technologies.
- Work with management team to plan for future equipment acquisitions.
- Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.
- Perform all other activities deemed necessary to management.

TECHNICIAN I

General Description

Under direct supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory.

Educational/Background Requirements

- High school diploma or equivalent.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician I.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Perform all other activities deemed necessary to management.

TECHNICIAN II

General Description

Under ***general*** supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory.

Educational/Background Requirements

- High school diploma or equivalent ***and 2 or more years of experience in an applicable discipline;*** or
- ***Associates degree and 1 or more years of experience in an applicable discipline;*** or
- ***BS degree in Chemistry or a related field of science***.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician II.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- ***Assist other technicians with their professional development.***
- ***Act as a company advocate by setting a positive example in work habits and attitude to other staff members.***
- ***Demonstrate ability to work independently with minimal errors.***
- ***Possess the minimum level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.***
- Perform all other activities deemed necessary to management.

TECHNICIAN III

General Description

Under ***minimal*** supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- High school diploma or equivalent and ***4*** or more years of experience in an applicable discipline; or
- Associates degree and ***3*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***
- ***MS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician III.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine/***non-routine*** maintenance ***and troubleshooting*** of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members.
- Demonstrate ***increased*** ability to work independently with minimal errors.

- Possess ***an above average*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput.***
- ***Assist in the development and maintenance of laboratory SOPs.***
- Perform all other activities deemed necessary to management.

TECHNICIAN IV

General Description

Under minimal supervision of the area manager and***/or the technical director***, performs ***complex*** tasks necessary for efficient operation of the laboratory. Eligible for consideration of group leader status.

Educational/Background Requirements

- High school diploma or equivalent and ***7*** or more years of experience in an applicable discipline; or
- Associates degree and ***5*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician IV.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation ***of, and assisting other technicians in,*** routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development ***and in the integration of new procedures and technologies.***
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, ***prospective employees, existing and prospective clientele, and the general public***.

- Demonstrate ***superior*** ability to work independently with minimal errors.
- Possess ***a superior*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput***, addition of new procedures/technologies and/or operation of additional equipment/instruments.***
- ***When appropriate, work with the technical director, laboratory president, or sales manager to develop new procedures and technologies.***
- ***Develop, review, and update laboratory SOPs as necessary.***
- Perform all other activities deemed necessary to management.

TECHNICIAN V

General Description

Under minimal supervision of the area manager and/or the technical director, performs complex tasks necessary for efficient operation of the laboratory. Eligible for consideration of group leader status. ***May work directly with the technical director, laboratory president, or sales manager to develop methods, procedures, and technologies for the laboratory.***

Educational/Background Requirements

- High school diploma or equivalent and ***10*** or more years of experience in an applicable discipline; or
- Associates degree and ***8*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or related field of science and ***4*** or more years of experience in an applicable discipline.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician V.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, and assisting other technicians in, ***and serving as the primary reference for,*** routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development and in the integration of new procedures and technologies.

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and prospective clientele, and the general public.
- Demonstrate superior ability to work independently with minimal errors.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput, addition of new procedures/technologies and/or operation of additional equipment/instruments.
- ***Responsible for the study and implementation of*** new procedures and technologies.
- Develop, review, and update laboratory SOPs as necessary***, write new SOPs as required to reflect advancement in procedures and technologies.***
- ***Work with management team to plan for future equipment acquisitions.***
- ***Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.***
- Perform all other activities deemed necessary to management.

Appendix B

Inorganic Analyses

Parameter	Reference Citation
ACIDITY AS $CaCO_3$	SDM 2310 B
ALKALINITY, BICARBONATE	SDM 2320 B
ALKALINITY, CARBONATE	SDM 2320 B
ALKALINITY, HYDROXIDE	SDM 2320 B
ALKALINITY, PHENOLPHTHALEIN	SDM 2320 B
ALKALINITY, TOTAL	SDM 2320 B
BOD, (5-DAY)	SDM 5210 B
BOD, (5-DAY), DISSOLVED	SDM 5210 B
BOD, CARBONACEOUS (5-DAY)	SDM 5210 B
BROMIDE	USEPA 9056, ASTM D1246-88
CARBON DIOXIDE	SDM 4500-CO_2 C
CARBON, DISSOLVED ORGANIC	USEPA 9060, SDM 5310 D
CARBON, PURGEABLE ORGANIC	USEPA 9060
CARBON, TOTAL INORGANIC	USEPA 9060
CARBON, TOTAL ORGANIC	USEPA 9060, MSA 29.3.5.2, SDM 5310 D
CARBON,ORGANIC(NON-PURGE)	USEPA 9060
CATION EXCHANGE CAPACITY	USEPA-9081
CHEMICAL OXYGEN DEMAND	SDM 5220 D
CHLORIDE	SDM 4500-Cl B, USEPA 300.0/9056
CHLORINE, TOTAL RESIDUAL	HACH-8167
CHROMIUM, HEXAVALENT	SDM 3500-Cr D/USEPA 7196A
COLIFORM, FECAL	SDM 9222 D
COLIFORM, TOTAL	SDM 9223 B
COLOR (APPARENT)	SDM 2120 B
CONDUCTIVITY @ 25*C	USEPA-120.1/9050A, SDM 2510 B
CORROSION TOWARD STEEL	USEPA-1110
CYANIDE, AMENABLE	USEPA-9012A, SDM 4500-CN G
CYANIDE, FREE	USEPA-9014
CYANIDE, WEAK ACID DIS.	SDM-4500-CN I
CYANIDE,TOTAL	USEPA-335.4/9012A
DENSITY	SDM 2710 F
EXTRACTABLE ORGANIC HALIDES-EOX	USEPA-9023
FLUORIDE	USEPA-300.0/9056, SDM 4500-F C
FORMALDEHYDE	USEPA-8315A
GROUNDWATER DEPTH	USGS
GROUNDWATER LEVEL	USGS
HARDNESS, TOTAL	SDM 2340 C
HEM; OIL & GREASE	USEPA-1664/9070A/9071B
HETEROTROPHIC PLATE COUNT	SDM 9215 B
IGNITABILITY, SETAFLASH CLOSED-CUP	USEPA-1020A
IRON, FERRIC BY CALCULATION	SDM 3500-Fe D
IRON, FERROUS	SDM 3500-Fe D
NITROCELLULOSE	USARMY BR&D Lab
NITROGEN, AMMONIA	SDM 4500-NH_3 G
NITROGEN, INORGANIC (NH4)	SDM 4500-NH_3 G
NITROGEN, INORGANIC (NO3+NO2)	USEPA-353.2, SDM 4500-NO_3 F
NITROGEN, INORGANIC	USEPA-350.1 + 353.2
NITROGEN, NITRATE	USEPA-300.0/353.2/9056, SDM 4500-NO_3 F

Inorganic Analyses

Parameter	Reference Citation
NITROGEN, NITRATE+NITRITE	USEPA-353.2, SDM 4500-NO_3 F
NITROGEN, NITRITE	USEPA-300.0/353.2/9056, SDM 4500-NO_2 B
NITROGEN, ORG. (NH4)	USEPA-350.1
NITROGEN, ORGANIC	USEPA-351.2
NITROGEN, TOTAL KJELDAHL	USEPA-351.2
ODOR	SDM 2150 B
OXYGEN, DISSOLVED	SDM 4500-O G
PAINT FILTER LIQUIDS TEST	USEPA-9095
PERCENT ASH	USEPA-160.4
PERCENT MOISTURE	SDM 2540 B
PERCENT SOLIDS	SDM 2540 B
PERCENT VOLATILE SOLIDS	USEPA-160.4, SDM 2540 G
pH	USEPA-150.1/9040B/9045C
PHENOLICS, TOTAL	USEPA-420.1/B17420.2/9066
PHOSPHORUS, ORTHO	SDM 4500-P E
PHOSPHORUS, TOTAL	USEPA-365.1, SDM 4500-P F
PHOSPHORUS, TOTAL-SOLUBLE	USEPA-365.1, SDM 4500-P F
RESIDUE, DISSOLVED @ 180C	SDM 2540 C
RESIDUE, DISSOLVED-VOL.	USEPA-160.4
RESIDUE, SUSPENDED	SDM 2540 D
RESIDUE, SUSPENDED-VOL.	USEPA-160.4
RESIDUE, TOTAL	SDM 2540 B
RESIDUE, TOTAL-VOLATILE	USEPA-160.4, SDM 2540 G
SGT-HEM; NON-POLAR MATERIAL	USEPA-1664/9070A/9071B
SILICA, DISSOLVED	SDM 4500-$Si0_2$ D
SODIUM HEXAMETAPHOSPHATE	USEPA-365.1
SPECIFIC GRAVITY	ASTM-D 1429-79, SDM 2710 F
STATIC WATER LEVEL	USGS
SULFATE	USEPA-300.0/375.2/9056/9038, SDM 4500-$S0_4$ F
SULFIDE	USEPA-9034, SDM 4500-S_2 F
SULFIDES, ACID VOLATILE	ET&C VOL 12
SULFITE	SDM 4500-SO_3 B
SURFACTANTS, MBAS	SDM 5540 C
TEMPERATURE	SDM 2550 B
THIOCYANATE	SDM 4500-CN M
TOTAL ORGANIC HALIDES	USEPA-9020B/9023
TURBIDITY	SDM 2130 B

Metals Analyses

Parameter	Reference Citation
ALUMINUM, ICP	USEPA-200.7/6010B
ANTIMONY, ICP	USEPA-200.7/6010B
ANTIMONY, MS	USEPA-200.8/6020
ARSENIC, ICP	USEPA-200.7/6010B
ARSENIC, MS	USEPA-200.8/6020
BARIUM, ICP	USEPA-200.7/6010B
BARIUM, MS	USEPA-200.8/6020
BERYLLIUM, ICP	USEPA-200.7/6010B
BERYLLIUM, MS	USEPA-200.8/6020
BORON, ICP	USEPA-200.7/6010B
BORON, MS	USEPA-200.8/6020
CADMIUM, ICP	USEPA-200.7/6010B
CADMIUM, MS	USEPA-200.8/6020
CALCIUM AS $CaCO_3$	USEPA-200.7/6010B
CALCIUM, ICP	USEPA-200.7/6010B
CHROMIUM, ICP	USEPA-200.7/6010B
CHROMIUM, MS	USEPA-200.8/6020
COBALT, ICP	USEPA-200.7/6010B
COBALT, MS	USEPA-200.8/6020
COPPER, ICP	USEPA-200.7/6010B
COPPER, MS	USEPA-200.8/6020
HARDNESS BY CALCULATION, ICP	USEPA-200.7/6010B
IRON, ICP	USEPA-200.7/6010B
LEAD, ICP	USEPA-200.7/6010B
LEAD, MS	USEPA-200.8/6020
LITHIUM, ICP	USEPA-200.7/6010B
MAGNESIUM AS $CaCO_3$, ICP	USEPA-200.7/6010B
MAGNESIUM, ICP	USEPA-200.7/6010B
MANGANESE, ICP	USEPA-200.7/6010B
MANGANESE, MS	USEPA-200.8/6020
MERCURY, COLD VAPOR	USEPA-245.1/7470A/7471A
MOLYBDENUM, ICP	USEPA-200.7/6010B
MOLYBDENUM, MS	USEPA-200.8/6020
NICKEL, ICP	USEPA-200.7/6010B
NICKEL, MS	USEPA-200.8/6020
PHOSPHORUS, ICP	USEPA-200.7/6010B
POTASSIUM, ICP	USEPA-200.7/6010B
SELENIUM, ICP	USEPA-200.7/6010B
SELENIUM, MS	USEPA-200.8/6020
SILICON, ICP	USEPA-200.7/6010B
SILVER, ICP	USEPA-200.7/6010B
SILVER, MS	USEPA-200.8/6020
SODIUM, ICP	USEPA-200.7/6010B
STRONTIUM, TOTAL	USEPA-200.7/6010B
THALLIUM, ICP	USEPA-200.7/6010B
THALLIUM, MS	USEPA-200.8/6020
TIN, ICP	USEPA-200.7/6010B
TIN, MS	USEPA-200.8/6020
TITANIUM, ICP	USEPA-200.7/6010B

Metals Analyses

Parameter	Reference Citation
VANADIUM, ICP	USEPA-200.7/6010B
VANADIUM, MS	USEPA-200.8/6020
ZINC, ICP	USEPA-200.7/6010B
ZINC, MS	USEPA-200.8/6020

Semi-Volatile Organic Analyses

Parameter	Reference Citation
HPLC ACRYLAMIDE	EPA-8316
GC ORGANOCHLORINE PESTICIDES	USEPA-608/8081A
GC METHOXYCHLOR	USEPA-608.2
HPLC POLYNUCLEAR AROMATIC HYDROCARBONS	USEPA-610/8310
GC/MS BASE/NEUTRAL/ACIDS	USEPA-625/8270C
GC ANALYSIS OF 1,2-DIBROMOMETHANE/ 1,2-DIBROMO-3-CHLOROPROPANE/ 1,2,3-TRICHLOROPROPANE BY MICROEXTRACTION	USEPA-8011
GC DIESEL RANGE ORGANICS	USEPA-8015B, CALIFORNIA LUFT METHOD, WISCONSIN METHOD PUBL-SW-141
GC POLYCHLORINATED BIPHENYLS	USEPA-8082
GC CHLORINATED HYDROCARBONS	USEPA-8121
GC HERBICIDES	USEPA-8151A
HPLC ALDEHYDES	USEPA-8315A
HPLC NITROAROMATICS AND NITRAMINES	USEPA-8330
HPLC NITROGLYCERINE	USEPA-8332

Volatile Organic Analyses

Parameter	Reference Citation
GC GASOLINE RANGE ORGANICS	USEPA-8015B, CALIFORNIA DHS LUFT, IOWA-PA1, WISCONSIN METHOD PUBL-SW-140
GC AIR ANALYSIS	40CFR METHOD 18
GC DISSOLVED HEADSPACE ANALYSIS OF METHANE/ETHANE/ETHYLENE	RSK-175
GC ALCOHOLS	USEPA-8015B
GC VOLATILE ORGANICS	USEPA-601/602/8021B
GC/MS VOLATILE ORGANICS	USEPA-524.2/624/8260B

Appendix C

TRIMATRIX
LABORATORIES

Monthly Ordering Sheet

Budget
Amt Spent

For the Month of: ______________________________

Date Requested	Approved By	Date Ordered	Initials	Quantity	Package Type	Qty of Pkg	Item	Catalog #	Contact	Vendor	PO Number	Backorder Date	Price for Each Unit	Date Received

Appendix D

TRIMATRIX LABORATORIES

Vendor Approval Record

Date Approved	Approved By	Vendor Name	Why Approved

Appendix E

TRIMATRIX LABORATORIES

Instrumentation and Equipment List June 2012

Inst. #	Department	Manufacturer	Description	Model Number	Date Purchased	Serial Number	Condition When Purchased
177	Administration	Mettler	Analytical Balance	AE200	1989	M78900	NEW
191	Administration	Fisher	Sonic Dismembrator	550	2008	BCK08095160A	NEW
192	Administration	Fisher	Sonic Dismembrator	550	2008	BCK080664919A	NEW
204	Administration	Mettler	Top-Loading Balance	BB2440	unknown	J58563	NEW
205	Administration	OHAUS	Top-Loading Balance	TP4KD	unknown	1211	NEW
206	Administration	Mettler	Top-Loading Balance	BB600	unknown	J94686	NEW
207	Administration	Denver	Analytical Balance	A-250	unknown	B041105	NEW
208	Administration	Mettler	Analytical Balance	AE163	1988	B86211	NEW
209	Administration	Mettler	Top-Loading Balance	PC4400	unknown	BO7964	NEW
210	Administration	Mettler	Analytical Balance	AE163	unknown	D34028	NEW
211	Administration	Mettler	Top-Loading Balance	PB1502	unknown	1113483830	NEW
212	Administration	Mettler	Analytical Balance	AB204	unknown	N96420	NEW
215	Administration	Denver	Top-Loading Balance	P-4002	unknown	P4K205207	NEW
223	Administration	Mistral	Centrifuge	MSE 2000	1994	SG93/07/503	NEW
225	Administration	Dionex	Accelerated Solvent Extractor	ASE 300	2006	SN 03070313	NEW
302	Administration	Branson	Ultrasonic Bath	3210	1992	3210R-MTH	NEW
307	Administration	Denver	Top-Loading Balance	Pinnacle Series P-2002	2007	P2K2126010	NEW
314	Administration	Mettler	Analytical Balance	XS-204	2008	1128261601	NEW
114	Metals	Perkin Elmer Perkin Elmer	ICP-Mass Spectrometer	ELAN 6000	1996 1996	8940000 4189	USED/GOOD NEW
116	Metals	Perkin Elmer Perkin Elmer	Trace ICP Spectrophotometer	Optima 3300 AS-91	1999 1999	069N9060301 4055	NEW NEW
201	Metals	Perkin Elmer Perkin Elmer	ICP-Mass Spectrometer	ELAN 6100 AS-93 Plus	2001 2001	G2620105 1454	NEW NEW
202	Metals	Banian Technology	Low-Level Mercury Analyzer	PSA 10.035 200.3	2001 2001	015 G7091	NEW NEW
216	Metals	Banian Technology	PSA Cold Vapor AA Mercury Analyzer	PSA 10.035 ASX-510	2002 2002	009 080223ASX	NEW NEW
217	Metals	Environmental Express	Hot Block Digestion Unit	SC154	2000	424CEC0564	NEW
218	Metals	Environmental Express	Hot Block Digestion Unit	SC154	2000	944CEC1008	NEW
219	Metals	Environmental Express	Hot Block Digestion Unit	SC154	2001	1423CEC1147	NEW
220	Metals	Environmental Express	Hot Block Digestion Unit	SC154	2001	1423CEC1313	NEW
311	Metals	Perkin Elmer Perkin Elmer	ICP-OES	Optima 5300DV AS-91	2007 2007	077C7032601 4055	NEW NEW
335	Metals	Perkin Elmer Perkin Elmer	ICP-Mass Spectrometer	NexION 300 ESI SCX-40	2011 2011	BD10551012 X4DX-HX-TSP-16-1-1012	NEW NEW
117	Semivolatiles GC	Agilent	GC PID/ELCD	6890	2001	US00039861	NEW
140	Semivolatiles GC	Hewlett Packard	GC PID-FID	5890 Series II	1994	3223A42974	NEW
144	Semivolatiles GC	Hewlett Packard Leap	Gas Chromatograph - Dual ECD	5890 Series II CTC ASE200	1994	3235A46675 1374189	NEW
157	Semivolatiles GC	Hewlett Packard Leap	Gas Chromatograph	5890A CTC ASE200	1989	2843A20176	NEW

TRIMATRIX LABORATORIES

Instrumentation and Equipment List June 2012

Inst. #	Department	Manufacturer	Description	Model Number	Date Purchased	Serial Number	Condition When Purchased
158	Semivolatiles GC	Hewlett Packard Leap	Gas Chromatograph	5890 Series II CTC ASE200	1991	3140A38326 13670	NEW
159	Semivolatiles GC	Varian	Gas Chromatograph	3400	1991	2436	NEW
199	Semivolatiles GC	Agilent Leap	Gas Chromatograph - Dual ECD	6890 CTC Combi-Pal	2001 2001	US00040752 121553	NEW
221	Semivolatiles GC	Perkin Elmer	HPLC	200 Series	2003	291N3061303	NEW
222	Semivolatiles GC	Agilent	Gas Chromatograph - Dual ECD	6890N 7873	2010	US10340101 CN33131890	NEW
332	Semivolatiles GC	Agilent Agilent	Gas Chromatograph - FID Autosampler	7890A w/LTM Module 7693	2010 2010	CN10827120 CN53801575	NEW
333	Semivolatiles GC	Agilent Agilent	Gas Chromatograph - FID	7890A w/LTM Module 7693	2010 2010	CN10401067 CN93801575	NEW
340	Semivolatiles GC	Perkin Elmer	HPLC with UV/Diode Array	Flexar	2011	292N1032201P	NEW
195	Semivolatiles MS	Agilent Leap	Mass Spectrometer - Quadrupole	6890/5973 Inert LEAP GC-PAL	1999 2008	US91411785 111250	NEW DEMO
224	Semivolatiles MS	Agilent	MSD	6890N/5973 Inert	2005	US44621107	NEW
308	Semivolatiles MS	Agilent Leap	MSD	6890N/5975 LEAP GC-PAL	2006 2006	US65125179 161239	NEW NEW
339	Semivolatiles MS	Agilent Agilent	Mass Spectrometer - Quadrupole	7890A 7693	2011	US10443605 161239	NEW NEW
323	Volatiles MS	Agilent	Mass Spectrometer - Quadrupole	6890N/5973 Inert	2008	US35120404	Reconditioned
328	Volatiles MS	Agilent	Mass Spectrometer - Quadrupole	7890A/5975C Inert	2009	US92033575	NEW
100	Wet Chemistry	Orion	pH/mV/ISE Meter	710A	1993	001353	NEW
120	Wet Chemistry	Shimadzu	UV/VIS Spectrophotometer	UV-1601	2001	A10753863116	NEW
188	Wet Chemistry	YSI	Conductivity Probe	Conductivity Meter	1999	99J0720	NEW
189	Wet Chemistry	Lachat	Flow-Injection Autoanalyzer	Quick Chem FIA+ 8000 Series	2000	A83000-1492	NEW
298	Wet Chemistry	Thermo	Discrete Analyzer	Konelab Aqua 20	2003	S2019179	NEW
299	Wet Chemistry	O.I. Analytical	Available Cyanide Analyzer	FS-3000	2003	847804926	NEW
303	Wet Chemistry	Thermo	Discrete Analyzer	Aquachem 20	2006	Z4618583	NEW
306	Wet Chemistry	Dionex	Ion Chromatograph	ICS-2000	2006	06020239	NEW
309	Wet Chemistry	Fisher Accumet	pH Meter	AB15	2007	AB92325491	NEW
310	Wet Chemistry	Market Forge	Autoclave	STM-E	2007	22607	
312	Wet Chemistry	HACH	Dissolved Oxygen Meter and Probe	HQ40d	2008	7070010664	NEW
313	Wet Chemistry	HACH	Turbidimeter	2100N	2008	07060C022389	NEW
315	Wet Chemistry	ThermoScientific	Total Organic Halide Analyzer (TOX/EOX)	ECS 1200	2007	2003.48	DEMO
324	Wet Chemistry	O.I. Analytical	Total Organic Carbon Analyzer (TOC)	Aurora 1030	2008	E750730372E	NEW
326	Wet Chemistry	O.I. Analytical	Available Cyanide Analyzer	FS-3100 Dual Channel	2008	821831887 826833549	NEW
330	Wet Chemistry	Shimadzu	UV/VIS Spectrophotometer	UV-1800	2009	A11454360182	NEW
334	Wet Chemistry	LECO	Carbon Analyzer	C632	2010	3456	NEW

Appendix F

New Employee Orientation Checklist

Name: _____ **Employee #:** _____ **Date of Hire:** ____/____/____

I. Personnel Information Review (Human Resources Manager)

Reviewed (☑)	Item
	Employee Information Sheet Completed
	I-9 Employment Eligibility Verification Form Completed
	W-4 Forms Completed
	Employee Benefits Reviewed
	Direct Deposit Forms Initiated
	Details of Compensation Reviewed
	Key Fob to the Facility Provided (Number _____)
	Employee Handbook Distributed
	Code of Ethics / Data Integrity Policy Agreement Form Signed and Collected. Violation of Ethics Policy Explained.

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Human Resources Manager Signature Employee Signature

New Employee Orientation Checklist

II. Quality Assurance Training (Quality Assurance Officer)

Reviewed (☑)		Item	
		Initial and Continuing Demonstration of Capability Requirements Reviewed	
		Corrective Action (Non-Conformance) Investigation Procedure Reviewed	
		Code of Ethics/Data Integrity Policies Explained	
		Initials Added to the Initials Logbook	
Training Forms Initiated for the Following Documents			
Initiated (☑)		**All Employees**	
		Quality Assurance Manual	
		GR-10-109	Employee Training Protocols
		GR-10-122	Preventive Action
		GR-10-124	Code of Ethics for Data Integrity
		GR-10-127	Error Correction Policies and Practices
YES	**NA**	**Job Specific**	
		USDA Soil Permit	
		GR-10-103	Guidelines for Data Generation, Validation, Approval, and Reporting
		GR-10-104	Chain-of-Custody (COC)
		GR-10-107	Documentation and Procedures for Instrument Maintenance Activities
		GR-10-115	Manual Integrations
		GR-10-118	Data Confidentiality
		GR-10-125	Method Detection Limit (MDL)
		GR-10-106	Inorganic and Metals Laboratories Corrective Actions
		GR-03-101	Semi-Volatiles Laboratory Quality Control Corrective Actions
		GR-03-124	Volatile Organic Laboratory Corrective Actions

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Quality Assurance Officer Signature Employee Signature

New Employee Orientation Checklist

III. Safety Training (Health and Safety Officer)

Reviewed (☑)	Item
	MSDS Location Discussed
	Safety Walk/Safety Equipment Review, First-Aid Cabinet Locations Identified
	Safety Exam Explained-First two of thirteen videos completed (others to be completed on own during normal working hours)

Training Forms Initiated for the Following Documents	
Initiated (☑)	**All Employees**
	Chemical Hygiene Plan
	Safety Manual
	Emergency Action Plan

YES	NA	The Following Safety Items were Ordered or Distributed
		Safety Glasses
		Lab Coat

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Safety Officer Signature Employee Signature

New Employee Orientation Checklist

IV. General Laboratory Area Overview (Area Supervisor)

Reviewed (☑)	Item
	Primary Job Responsibilities Reviewed
	Job Levels and Requirements for Advancement Reviewed
	Introduction to Apparatus and Materials Completed
	Specific Laboratory Area Safety Issues Reviewed
	Method/SOP – Laboratory Intranet Library Directories Shown
	Instrument Manual Storage Location Shown
	Instrument Maintenance Logbook Requirements Reviewed
	Instrument Run Logbook Requirements Reviewed
	Method Detection Limit Study Requirements Reviewed
	Overview of Laboratory Area LIMS Requirements and Procedures Reviewed
	General Paperwork Flow and Benchsheet Procedures Reviewed
	QC Types / Control Windows / Qualifier Procedures Reviewed
	Data Review and Documentation Procedures Reviewed

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Area Supervisor Signature Employee Signature

Appendix G

CODE OF ETHICS / DATA INTEGRITY AGREEMENT

All full time, part time and contracted employees working for TriMatrix Laboratories, Inc. are required to make every effort to conduct quality work with data integrity, ethical practices and professionalism. To ensure strength in the individual, in the laboratory organization and in client relationships, each employee must be aware of the following company policies:

I. Each TriMatrix employee is responsible for the propriety and consequences of his or her actions when representing the laboratory through sample analysis, data review, adherence to policies and procedures, client /vender relationships, other employees and/or visitors.

II. All aspects of company business must be conducted in an ethical, legal and professional manner, and in compliance with all applicable federal, state and local laws and regulations.

III. Under no circumstances must client confidentiality be compromised or any information regarding the client be revealed to another agency without the client's prior written permission.

IV. Gratuities, gifts and/or rewards provided by clients or vendors are laboratory property and may not be kept for personal use without written approval.

V. Reporting of data integrity issues is encouraged. Reporting shall be kept confidential when anonymity is requested and/or required.

Additionally, violations of the data integrity/code of ethics policy may result in immediate termination of employment with TriMatrix Laboratories, Inc. Such violations include the following:

A. Intentionally misrepresenting laboratory data in any manner.

B. Intentionally misapplying any date and/or time.

C. Intentional representation of another employee without written approval.

D. Intentional omission of any information, fact or datum.

E. Intentional deviation from or shortcut through a procedure without written approval.

A highly ethical approach to laboratory analysis/reporting is a key component of the TriMatrix laboratory objective. This approach is backed by management in providing the facilities, equipment and time necessary minimize undue pressures to make compromises, whether such pressures be internal or external.

AGREEMENT STATEMENT

I have read and understood the Code of Ethics/Data Integrity Agreement, and agree to abide by all policies stated. I understand that violation of these policies may result in severe consequences up to and including termination of my employment with TriMatrix Laboratories, Inc.

_____	_____	_____
Employee (print name)	Signature	Date

Appendix H

TRIMATRIX LABORATORIES

********** LABORATORY

DEMONSTRATION OF CAPABILITY FOR ********

Parameter	Date Analyzed	Method	Inst. #	Units	Amount Apiked	Cert. #1 Amount Found	Cert. #2 Amount Found	Cert. #3 Amount Found	Cert. #4 Amount Found	Average Percent Recovery	Percent Recovery Window	Pass/Fail Percent Recovery	Percent RSD	Percent RSD Window	Percent RSD Pass/Fail	Overall Pass/Fail

Appendix I

TRIMATRIX LABORATORIES

INORGANIC LABORATORY
DEMONSTRATION OF CAPABILITY

Parameter: Percent Solids **Trainer:** John Doe

Method: SW-846 3550B/GR-07-115 **Trainee:** John Smith

Analyst	Date	Run #1	Run #2	Run #3	Run #4	Units	Inst. #	Standard Deviation	Average	Degrees of Freedom D	Experimental Student's t Value	Tabular Student's t Value	Are the Two Sets of Results Statistically the Same AND RSDs<20?
John Doe	12/31/02	48.3	55.6	44.2	47.5	%	117	4.81	48.9	5.48	0.227	3.365	YES(PASS)
John Smith	12/31/02	45.9	50.2	52.1	44.7	%	117	3.50	48.2				

Appendix J

New Instrument Information and Initial Demonstration of Capability

Item:		**Serial Number:**	
Manufacturer:		**Date Received:**	
Model:		**Location:**	

Initial Demonstration of Capability Passed: _____

Date Initial Demonstration of Capability Completed: _____

Initial Demonstration of Capability Data Attached: _____

Adequate Sensitivity Achieved (LFB or MDL Completed): Yes / No / N/A

LFB or MDL Documentation Attached: Yes / No / N/A

Date LFB or MDL Completed: _____

Linear Range Developed and Demonstrated: Yes / No / N/A

Linear Range Development Information Attached: Yes / No / N/A

Software Verification Completed (QA Use Only): Yes / No / N/A

Date Software Verification Completed (QA Use Only): _____

Notes: _____

Approvals and Assigned Instrument Number

_____ _____

Quality Assurance Officer **Area Supervisor**

TriMatrix Instrument Number: _____ **Date In Service:** _____

Appendix K

NELAC Demonstration of Capability Certification Statement

Employee Name: Cook, Chelsey **Date:** 05/11/12

Method Name(s), Number(s), and Revision(s):

[5210 B 20th ed/online] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, Part 5210 B, "5-Day BOD Test"; Standard Methods for the Examination of Water and Wastewater, online Edition, 2001, Part 5210 B, "5-Day BOD Test" (Note: All dissolved oxygen readings are taken with a luminescence probe instead of the membrane probe described in the method) Title: Biochemical Oxygen Demand (5-day BOD/CBOD)

Matrix: not applicable **Analyte(s) or Parameter:** procedure revision

SOP Number: GR-18-103 **Revision Number:** REV 2.6

We, the undersigned, CERTIFY that:

YES	/	NA	
		X	1. The analyst identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.
		X	2. The test method(s) was performed by the analyst identified on this certification.
X			3. A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site.
		X	4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory.
		X	5. All raw data (including a copy of this certification form) necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors.

With *true* meaning consistent with supporting data; *accurate* meaning based on good laboratory practices consistent with sound scientific principles/practices; *complete* meaning includes the results of all supporting performance testing; and *self-explanatory* meaning data properly labeled and stored so that the results are clear and require no additional explanation.

This certification form must be completed each time an Initial Demonstration of Capability study is performed, or when a Continuing Demonstration of Capability study is performed in conjunction with a revised SOP.

Heather L. Brady — Area Supervisor — Date

Tom C. Boocher — Quality Assurance Officer — Date

Appendix L

TRIMATRIX LABORATORIES

LABORATORY TRAINING CHECKLIST

Trainee Name:	Soloway, Kristen
Trainer Name:	Banach, Christine
Method Number(s) and Revision(s):	[5210 B 20th ed/online] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, Part 5210 B, "5-Day BOD Test"; Standard Methods for the Examination of Water and Wastewater, online Edition, 2001, Part 5210 B, "5-Day BOD Test" (Note: All dissolved oxygen readings are taken with a luminescence probe instead of the membrane probe described in the method) Title: Biochemical Oxygen Demand (5-day BOD/CBOD)
SOP Name, Number, and Revision:	Biochemical Oxygen Demand (5-Day BOD/CBOD), GR-18-103, REV 2.6
Applicable Matrices:	wastewaters, effluents and polluted waters

NA	Trainer/Trainee Initials	Item
❑		1) The trainee has read the Standard Operating Procedure, and when referenced, the associated method.
❑		2) The trainer has reviewed the Standard Operating Procedure, and when referenced, the associated method, with the trainee.
❑		3) The trainer has demonstrated the procedure for the trainee.
❑		4) The trainee has correctly performed the procedure under direct supervision of the trainer.
❑		5) The trainee has been instructed in all QA/QC requirements of the procedure.
❑		6) The trainee has been instructed in all paperwork, logbook and benchsheet requirements relevant to the procedure.
❑		7) The trainee has successfully and exclusively completed an Initial Demonstration of Capability (IDC).
❑		8) The DoC spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.

The required Items have been successfully completed. In my opinion, initial training is now complete, and the trainee is capable of correctly performing the procedure.

Trainer:_____ **Date:** _____

I have read and understand the SOP, understand what is required, and agree to follow it as written. I understand that I may not deviate from the SOP without prior approval from management.

Trainee:_____ **Date:** _____

Appendix M

TRIMATRIX LABORATORIES

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY

2012 WATER/SOIL

METHOD DETECTION LIMIT STUDY

Parameter / Compound	Instrument Number	Reference Citation	Date Analyzed	Amount Spiked	Units	Rep. #1 Amount Found	Rep. #2 Amount Found	Rep. #3 Amount Found	Rep. #4 Amount Found	Rep. #5 Amount Found	Rep. #6 Amount Found	Rep. #7 Amount Found	Average Amount Found	Average % Recovery	Standard Deviation	MDL

TRIMATRIX
LABORATORIES

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY
2012 WATER/SOIL
METHOD DETECTION LIMIT STUDY

Parameter / Compound	Average Amount Found	Average % Recovery	Standard Deviation	MDL	Amount Spiked	MDL Window	Pass / Fail	Average % Recovery Check	Minimum Report Limit (Amount Spiked)	Difference Between Minimum Reporting Limit and
							Missing Parameter / Compound			
							Missing Parameter / Compound			
							Missing Parameter / Compound			
							Missing Parameter / Compound			
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							Missing Parameter / Compound			

TRIMATRIX LABORATORIES

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY

2012 WATER/SOIL

LIMIT OF DETECTION (LOD) VERIFICATION STUDY (INITIAL)

Parameter / Compound	Instrument Number	Reference Citation	MDL Result	Units	Date	Analyst	LOD Verification Concentration	MDL/LOD Verification Concentration Difference	MPB Result	LOD Verification Result	MPB/LOD Verification Response Increase	LOD Verification Acceptable (≥3x MPB Response)?

file: MDL 2012_10.XLS

revision: 2012.20

Appendix N

CONTINUING DEMONSTRATION OF CAPABILITY CHECKLIST

Employee Name: Cook, Chelsey

Method Number(s) and Revision(s): [5210 B 20th ed/online] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, Part 5210 B, "5-Day BOD Test"; Standard Methods for the Examination of Water and Wastewater, online Edition, 2001, Part 5210 B, "5-Day BOD Test" (Note: All dissolved oxygen readings are taken with a luminescence probe instead of the membrane probe described in the method) Title: Biochemical Oxygen Demand (5-day BOD/CBOD)

Specific Analyte(s): BOD analysis

Date of Analysis: 05/09/12

SOP Number: GR-18-103

Revision: REV 2.6

Applicable Matrices: wastewaters, effluents and polluted waters

Specific matrix: water

Area Supervisor: hlb

CDC Completed via	
X	Preparing or analyzing four BSs or SCVs as a repeat of the initial demonstration study.
	Calculating a CDC from four existing consecutive BSs or SCVs (if done exclusively by the analyst).
	Statistical comparison of four same-sample aliquots against another analyst's identical data.
	Calculating a CDC from the last four runs of an MDL study (if done exclusively by the analyst).
	The successful completion of a blind PT study sample (if done exclusively by the analyst). Study Name:

N/A	Yes	DOC Supporting Data
	X	The DOC spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.
X		Documentation that shows only the last four runs from an MDL study, or that four consecutive BSs or SCVs were used is attached.
	X	NELAC Demonstration of Capability Certification Statement attached.

Analyst Signature: _____ Date:_____

Area Supervisor Signature: _____ Date:_____

Quality Assurance Officer Signature: _____ Date:_____

TRIMATRIX LABORATORIES

SOP MINOR REVISION
LABORATORY TRAINING CHECKLIST

Employee Name:	Cook, Chelsey
Method Number(s) and Revision(s):	[5210 B 20th ed/online] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, Part 5210 B, "5-Day BOD Test"; Standard Methods for the Examination of Water and Wastewater, online Edition, 2001, Part 5210 B, "5-Day BOD Test" (Note: All dissolved oxygen readings are taken with a luminescence probe instead of the membrane probe described in the method) Title: Biochemical Oxygen Demand (5-day BOD/CBOD)
SOP Name, Number, and Revision:	Biochemical Oxygen Demand (5-Day BOD/CBOD), GR-18-103, REV 2.6
Applicable Matrices:	wastewaters, effluents and polluted waters

NA	Employee Initials		Item
❑		1)	I have read and understood the updated method and/or the revised Standard Operating Procedure.
❑		2)	I have read and understood any new QA/QC requirements of this procedure.
❑		3)	NELAC Demonstration of Capability Certification Statement is attached.

I have read and understand the revised SOP, understand what is required, and agree to follow it as instructed. I understand that I may not deviate from the SOP without prior approval from management.

Date:_____ **Employee Signature:**_____

The SOP revision has been successfully implemented.

Date:_____ **QA/QC Signature:**_____

Appendix O

TRIMATRIX LABORATORIES

Container Packing List

For any questions regarding these containers, contact a Project Chemist at (616) 975-4500.

Client: _____ Project: _____ Page 1 of 1

#	Sets	Sample Locations	Sample Container Types and Quantities Requested																									
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1																													
2																													
3																													
4																													
5																													
6																													
7																													
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9																													
10																													
11																													
12																													
13																													
14																													
15																													
16																													
17																													
18																													
19																													
20																													
		Total Containers																											

This container type requires field-filtering

MATRIX	#	TEST	SIZE (mL) / TYPE CONTAINER	OPTIONS	PRESERVATIVE	TAG COLOR
WATER	0	Unpreserved Purgeable Organics	40 mL Clear Glass Vial	40	Cool to 4° C	Yellow & Black Stripe
	1	Preserved Purgeable Organics	40 mL Clear Glass Vial (pre-preserved)	40	HCl; Cool to 4° C	Yellow
	2	Non-Purgeable Organics	1000 mL Amber Glass	1000	Cool to 4° C	Salmon
	3	General ☐ Short Hold	Plastic	125, 250, 500, 1000	Cool to 4° C	Green
	4	Nutrients	Plastic	125, 250, 500, 1000	pH <2 w/ H_2SO_4	Dark Blue
	5	Cyanides	500 mL Amber Plastic	500	pH >12 w/ NaOH	Light Blue
	6	Total Metals	Plastic	125, 250, 500, 1000	pH <2 w/ HNO_3	Red
	7	Oil & Grease/TPH	Clear Glass	1000WM, 1000NM	pH <2 w/ H_2SO_4	Dark Blue
	8	Bacteria	125 mL Plastic (pre-preserved)	125	$Na_2S_2O_3$; Cool to 4° C	Pre-Labeled (White)
	9	Sulfide:	500 mL Amber Glass	500	Choose Total or Dissolved	Light Green
	10	TOX	250 mL Amber Glass **w/ Septa Lid**	250	pH <2 w/ H_2SO_4	Lilac
	11	TOC	40 mL Amber Vial	40	pH <2 w/ H_2SO_4	Pink
	12	DRO	1000 mL Amber Glass	1000	pH <2 w/ HCl	Gray
	13	Phenols	500 mL Amber Glass	500	pH <2 w/ H_2SO_4	Brown
	14	Formaldehyde	250 mL Amber Glass	250	Cool to 4° C	Orange
	15	Dissolved Metals	Plastic	125, 250, 500, 1000	pH <2 w/ HNO_3	Red & White Stripe
SOIL	16	Inorganics/Metals	WM Plastic	125, 250, 500, 1000	Cool to 4° C	White
	17	Non Purgeable Organics	WM Clear Glass	125, 250, 500, 1000	Cool to 4° C	Manila
	18	Purgeable Organics - Bulk	60 mL WM Clear Glass	60	Cool to 4° C	Light Yellow
	19	TCLP Volatiles	125 mL Clear Glass Vial	125	Cool to 4° C	Yellow & Black Stripe
	20	% Solids	125 mL WM Plastic	125	Cool to 4° C	Yellow & White Stripe
	21	Purgeable Organics	Encore Sampler	5g, 25g	Cool to 4° C	Label on Bag
	22	Purgeable Organics - PrePres.	40 mL Pre-Tared Clear Glass Vial + 10 mL MeOH ampule	40	MeOH in field; Cool to 4° C	Pre-Labeled (Light Yellow added at Lab)
MISC	23					
	24					
	25					
	26					

Notes: _____

DI Water for Equipment Blanks	Container Type and Size	Quantity
VOC Free		
Millipore		
ASTM Metals Free		

TRIMATRIX LABORATORIES

Project Chemist Initials	Added to Calendar & Folders (initials/date)	Revision	Revised By/Date

Client: _____ Project Manager: _____

Project: _____ Contact: _____

TriMatrix Project No: _____ Date of Request: _____

Type of Order: ○ One-Time ⇨ Due to Client: _____ ○ AM ◉ PM

or

◉ Calendar ⇨ Frequency: ○ Weekly ○ Semi-Annually ○ Monthly ○ Annually ○ Quarterly ◉ Daily

Prepare Containers For:

Months	☐ Jan	☐ Feb	☐ Mar	☐ Apr	☐ May	☐ Jun
	☐ Jul	☐ Aug	☐ Sep	☐ Oct	☐ Nov	☐ Dec
Weeks	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	
Days	☐ M	☐ T	☐ W	☐ TH	☐ F	

Containers will be ◉ Picked Up or ○ Shipped via: ○ First Overnight ◉ Standard Overnight ○ Priority Overnight ○ Express Saver ○ 2-Day ○ Ground ○ Saturday Delivery ○ TriMatrix Courier ○ Other: _____

Pick up/Ship Date: _____

Ship Containers to:

☐ Shipment to be billed to FedEx Account No.:

Telephone No: _____

Shipment to include: ☐ COCs (Qty) ____ ☐ Custody Seals ☐ Temperature Blanks ☐ MSDS Sheets for all preservatives used ☐ WB TM#? ○ Y ◉ N

Comments: ☐ Cooler Banding Required

Assembled by/Date:	Checked by/Date:	Shipped by/Date:

Cooler Number(s) Used:	Coolers Sealed With Tape	Coolers Sealed With Banding Strap	Tracking Number Label(s):
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

Appendix P

Sample Receipt Record

TRIMATRIX LABORATORIES

Date: _____

Delivery Method A: _____	**No. of Sample Boxes:** _____	**Number of Coolers:** _____	**Signed for By:** _____	**Time:** _____
Delivery Method B: _____	**No. of Sample Boxes:** _____	**Number of Coolers:** _____	**Signed for By:** _____	**Time:** _____
Delivery Method C: _____	**No. of Sample Boxes:** _____	**Number of Coolers:** _____	**Signed for By:** _____	**Time:** _____
Delivery Method D: _____	**No. of Sample Boxes:** _____	**Number of Coolers:** _____	**Signed for By:** _____	**Time:** _____
TriMatrix Courier (TC): _____	**No. of Sample Boxes:** _____	**Number of Coolers:** _____	**Signed for By:** _____	**Time:** _____

Page/ Line Number	Client	Quantity of Coolers OR TriMatrix Cooler Number	Arrived in Laboratory					Work Order Number	Folder Prepared (✓)
			Time	AM	PM	Received By	Delivery Method Letter		
49-1									
49-2									
49-3									
49-4									
49-5									
49-6									
49-7									
49-8									
49-9									
49-10									
49-11									
49-12									
49-13									
49-14									
49-15									
49-16									
49-17									
49-18									
49-19									
49-20									

Appendix Q

SAMPLE RECEIVING / LOG-IN CHECKLIST

TRIMATRIX LABORATORIES

Client	Work Order #: New / Add To
Receipt Record Page/Line #	Project Chemist / Sample #s

Recorded by (initials/date)	☐ Cooler ☐ Box ☐ Other_____	Qty Received	Thermometer Used: ☐ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#_____)	☐ See Additional Cooler Information Form

Cooler #	Time	Cooler #	Time	Cooler #	Time	Cooler #	Time

Custody Seals:
- ☐ None
- ☐ Present / Intact
- ☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
- ☐ Loose Ice / Avg 2-3 containers
- ☐ Bagged Ice / Avg 2-3 containers
- ☐ Blue Ice / Avg 2-3 containers
- ☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
- ☐ Temperature Blank (TB)
- ☐ 1 Container

	Recorded °C	Correction Factor °C	Actual °C
Temp Blank:			
TB location: Representative / Not Representative			
1			
2			
3			
Average °C			

- ☐ Cooler ID on COC?
- ☐ VOC Trip Blank received?

If any shaded areas checked, complete Sample Receiving Non-Conformance and/or Inventory Form

Paperwork Received

Yes	No	
☐	☐	Chain of Custody record(s)? If No, Initiated By _____
☐		Received for Lab Signed/Date/Time?
☐	☐	Shipping document?
☐	☐	Other _____

COC Information

☐ TriMatrix COC ☐ Other_____

COC ID Numbers:

Check Sample Preservation

N/A	Yes	No	
	☐	☐	Average sample temperature ≤6° C?
☐	☐	☐	Was thermal preservation required?
☐	☐		If "No", Project Chemist Approval Intials:_____
☐	☐		If "Yes" Completed Non Con Cooler - Cont Inventory Form?
☐	☐		Completed Sample Preservation Verification Form?
☐	☐	☐	Samples chemically preserved correctly?
☐	☐		If "No", added orange tag?
	☐	☐	Received pre-preserved VOC soils?
		☐ MeOH ☐ Na_2SO_4	

Check COC for Accuracy

Yes	No	
☐	☐	Analysis Requested?
☐	☐	Sample ID matches COC?
☐	☐	Sample Date and Time matches COC?
☐		Container type completed on COC?
☐	☐	All container types indicated are received?

Check for Short Hold-Time Prep/Analyses

- ☐ Bacteriological
- ☐ Air Bags
- ☐ EnCores / Methanol Pre-Preserved
- ☐ Formaldehyde/Aldehyde
- ☐ Green-tagged containers
- ☐ Yellow/White-tagged 1L ambers (SV Prep-Lab)

AFTER HOURS ONLY:
COPIES OF COC TO LAB AREA(S)
- ☐ NONE RECEIVED
- ☐ RECEIVED, COCs TO LAB(S)

Sample Condition Summary

N/A	Yes	No	
	☐	☐	Broken containers/lids?
	☐	☐	Missing or incomplete labels?
	☐	☐	Illegible information on labels?
	☐	☐	Low volume received?
	☐	☐	Inappropriate or non-TriMatrix containers received?
☐	☐	☐	VOC vials / TOX containers have headspace?
☐	☐	☐	Extra sample locations / containers not listed on COC?

Notes

☐ Trip Blank received ☐ Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
		Yes / No

TRIMATRIX LABORATORIES — SAMPLE RECEIVING / LOG-IN CHECKLIST - page 2

Project Chemist Use

Notify Laboratory Personnel of Short Hold-Times and/or Rush Work ☐ **NONE**

(Lab personnel notified/Date)

- ☐ Inorganics _____
- ☐ Microbiology (Bacteria) _____
- ☐ Metals Prep _____
- ☐ Metals _____
- ☐ GC-Volatiles _____
- ☐ MS-Volatiles _____
- ☐ Semi-Vol. Prep _____
- ☐ GC-Semi-Volatiles _____
- ☐ MS-Semi-Volatiles _____

Log-In Priority ☐ RUSH ☐ Standard

Project Chemist Notes to Log-In Personnel

Trip Blank: ☐ Log-In ☐ Do Not log-in

☐ Prep Storage Blank for client (VOCs)

☐ Sub-Contracting required ☐ Coolant required

☐ Non-TriMatrix or non-standard container type(s) received
Check pH of container type _____
Expected pH:_____ ☐ Adjust if needed

☐ Adjust pH of orange-tagged containers

☐ Lab-filter samples and document on Preservation Form

Sample narratives to be added at Log-In

Log-In Use

Log Samples into LIMS Sample #s

N/A	Yes	
	☐	Receive samples in LIMS
	☐	Date/Time received entered in LIMS match COC
	☐	Read Work Order narratives
☐	☐	Enter VOC rack/tray number into Work Order narrative
	☐	Enter sample information into LIMS
☐	☐	Add any sample narratives
☐	☐	If non-conformance issues, add sample qualifiers
	☐	Print sample number labels

Log-in Analyst (initials/date/time)

Label Sample Containers

N/A	Yes	No	
	☐	☐	LIMS label matches tag?
☐	☐		**DISCREPANCIES CORRECTED IN LIMS**
			Initials/Date: _____
☐	☐		Applicable stickers applied to labels?
			☐ MS/MSD sample
			☐ Composite before analysis
☐	☐		Applicable stickers applied to containers?
			☐ Waste sample
			☐ PT sample
			☐ USDA regulated
	☐	☐	Orange-tagged containers present?
☐	☐	☐	Adjust pH per project chemist?
☐	☐		Initials and Date/Time adjusted on orange tag?
☐	☐		Initials and Date/Time adjusted on Preservation Form?

Verify Label Accuracy

	☐	Second analyst checked labels for accuracy?
☐	☐	Verify that orange-tagged containers adjusted/initialed?

Labeled by (initials/date)	Verified by (initials/date)

Sample Storage Check all that apply:

Bacteria…… ☐	Bacteria refrigerator
Non-Volatiles…… ☐	Walk-In cooler
Volatiles…… ☐	Volatile Lab refrigerator
Waste…… ☐	Waste Cabinet
Waste VOCs..... ☐	Log-In hood refrigerator
Low-Level Hg …… ☐	Metals Lab - DO NOT STORE IN WALK-IN

Paperwork

N/A	Yes	
	☐	Original COC (White)
	☐	Copy of COC (Yellow)
	☐	Receiving/Log-In Checklist
☐	☐	Additional Cooler Information Form
☐	☐	Sample Preservation Verification
☐	☐	Sample Receiving Non-Conformance Form
☐	☐	Shipping Documents
☐	☐	Custody Seals
	☐	Arrival Log
☐	☐	Other (Note)

For Internal Use Only - DO NOT COPY

Appendix R

TRIMATRIX
LABORATORIES

SAMPLE RECEIVING / LOG-IN CHECKLIST
ADDITIONAL COOLER INFORMATION

Recorded by (initials/date)	Client	Work Order #
	Receipt Log # Sample #s	Project Chemist

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # Time

Custody Seals:
☐ None
☐ Present / Intact
☐ Present / Not Intact

Coolant Location:
Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
☐ Loose Ice / Avg 2-3 containers
☐ Bagged Ice / Avg 2-3 containers
☐ Blue Ice / Avg 2-3 containers
☐ None / Avg 2-3 containers

Alternate Temperature Taken Via:
☐ Temperature Blank (TB)
☐ 1 Container

Recorded °C	Correction Factor °C	Actual °C
Temp Blank:		

TB location: Representative / Not Representative

1		
2		
3		
Average °C		

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Comments

Appendix S

SAMPLE PRESERVATION VERIFICATION FORM

page _____ of _____

Client		Work Order #
Receipt Log #	Completed By (initials/date)	Project Chemist

COC ID #			Adjusted by:_____ Date:_____		DO NOT ADJUST pH FOR THESE CONTAINER TYPES			
Container Type	5 / 23	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	**>12**	**<2**	**<2**		**6-8**	**<2**	**<2**	
COC Line #1								
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6								
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

COC ID #			Adjusted by:_____ Date:_____		DO NOT ADJUST pH FOR THESE CONTAINER TYPES			
Container Type	5	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	**>12**	**<2**	**<2**		**~7**	**<2**	**<2**	
COC Line #1								
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6								
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

Ph Strip Lot #

☐ **HC133115**

☐ _____

Aqueous Samples: For each sample and container type, check the box if pH is acceptable. If pH is not acceptable for any sample container, record pH in box, and note on Sample Receiving Checklist and on Sample Receiving Non-Conformance Form. If approved by Project Chemist, add acid or base to the sample to achieve the correct pH. Add up to, but do not exceed 2x the volume initially added at container prep (see table below for initial volumes used). Add orange pH tag to sample container and record information requested. Record adjusted pH on this form. Do not adjust pH for container types 3, 6, and 15.

Container Size (mL)	**Original Vol. of Preservative (mL)**
Container Type 5	NaOH
500	2.5
1000	5.0
Container Type 4	H_2SO_4
125	0.5
250	1.0
500	2.0
1000	4.0
Container Type 13	H_2SO_4
500	2.5

Appendix T

TRIMATRIX LABORATORIES

SAMPLE RECEIVING NON-CONFORMANCE REPORT

Client		Work Order #
Receipt Log #	Completed By (initials/date)	Project Chemist

List non-conformance issues associated with this work order in the chart below/left. Identify discrepancies between the COC and sample tags in the chart below/right. Add comments as needed.

COC ID #	Line #	Type of Problem										COC					Sample Tag					Line Item Comments
		Discrepancy	Missing Container	Broken Container	Label Missing / Incomplete	Label Illegible	Low Volume	Inappropriate Container	Headspace	Not Listed on COC	Preservation	Sample Field ID	Date Sampled	Time Sampled	Container Type	Qty	Sample Field ID	Date Sampled	Time Sampled	Container Type	Qty	

General Comments:

Project Chemist (initials/date)

Appendix U

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Report To:
Environmental Resource Associates
[redacted]
5540 Marshall Street
Arvada, CO 80002
Phone: 800-372-0122
Fax: 303-421-0159

Invoice To:
Analytical Products Group
To Whom it May Concern
2730 Washington Boulevard
Belpre, OH 45714
Phone: 800-272-4442
Fax: 740-423-5588

Package Due Date: **n.a.**
W.O. Due Date: **May-17-12 23:00 (19 day TAT)**
Date Received: Apr-20-12 00:00
Date Logged In: Apr-20-12 13:38
W.O. Comments: *QC is 3MD; full list spike*

Report Level: **3MD**
Received By: Jennifer L. Rice
Logged In By: Jennifer L. Rice

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-23 DON'T USE Total Residual Chlorine [Water]				
Sampled Apr-20-12 00:00 Eastern by				
1204360-01 1: Minerals [Water]				
Sampled Apr-20-12 00:00 Eastern by				
Alkalinity, Total 2320 B	May-17-12 13:40	28	May-04-12 00:00	ERA WP Minerals
Chloride 9056A	May-17-12 13:40	28	May-18-12 00:00	ERA WP Minerals
Chloride 9251	May-17-12 13:40	28	May-18-12 00:00	
Conductivity 9050A	May-17-12 13:40	28	May-18-12 00:00	ERA WP Minerals
Fluoride 4500-F C	May-17-12 13:40	28	May-18-12 00:00	Delete Fluoride sample and ADD to Minerals
Fluoride 9056A	May-17-12 13:40	28	May-18-12 00:00	Delete Fluoride sample and ADD to Minerals
K Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	ERA WP Minerals
Na Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	ERA WP Minerals
Solids, TDS 2540 C	May-17-12 13:40	28	Apr-27-12 00:00	Remove from WP Solids but leave in WP Minerals
Solids, Total 2540 B	May-17-12 13:40	28	Apr-27-12 00:00	Remove from WP Solids and add to WP Minerals
Sulfate 9038	May-17-12 13:40	28	May-18-12 00:00	ERA WP Minerals
Sulfate 9056A	May-17-12 13:40	28	May-18-12 00:00	ERA WP Minerals
1204360-02 2: Hardness [Water]				
Sampled Apr-20-12 00:00 Eastern by				
Ca Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	REMOVE from Minerals
Calcium Hardness as CaCO3 6010B [Calc]	May-17-12 13:40	28	Apr-30-12 00:00	REMOVE from Minerals
Hardness 2340 C (Custom Equation)	May-16-12 17:00	19	Oct-17-12 00:00	
Hardness 6010B (Calc)	May-17-12 13:40	28	Oct-17-12 00:00	REMOVE from Minerals
Mg Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	REMOVE from Minerals
Solids, TSS 2540 D	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Solids

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-03 3: pH [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
pH 9040B	May-17-12 13:40	28	Apr-20-12 00:00	GOOD WP pH
1204360-04 4: Settleable Solids [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Solids, Settleable 2540 F	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Settleable Solids
1204360-05 5: Volatile Solids [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Solids, TVS 160.4 (mg/L)	May-17-12 13:40	28	Apr-27-12 00:00	
1204360-06 6: Simple Nutrients [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Nitrogen, Ammonia 4500-NH3 G	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Nutrients
Nitrogen, NO3 4500-NO3 F	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nutrients
Nitrogen, NO3 9056A	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nutrients
Nitrogen, NO3+NO2 4500-NO3 F	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Nitrate-Nitrite as N
Phosphate, Ortho 4500-P E	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nutrients
1204360-07 7: Complex Nutrients [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Nitrogen, TKN 351.2	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Nutrients
Phosphorus, Total 4500-P E	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Nutrients
1204360-08 8: Nitrite as N [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Nitrogen, Nitrite SM 4500-NO3 F	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nitrite as N
Nitrogen, NO2 4500-NO2 B	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nitrite as N
Nitrogen, NO2 9056A	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Nitrite as N
1204360-09 9: Demand [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
BOD 5-Day 5210B	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Demand
BOD 5-Day Carb 5210 B	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Demand
COD 5220 D	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Demand
TOC 9060	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Demand
1204360-10 10: Oil & Grease [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
HEM: O&G 1664A	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Oil & Grease
1204360-11 11: Trace Metals [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Ag Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-11 11: Trace Metals [Water]				
Sampled Apr-20-12 00:00 Eastern by				
Ag Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Al Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Al Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	
As Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
As Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
B Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
B Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Ba Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Ba Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Be Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Be Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cd Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cd Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Co Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Co Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cr Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cr Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cu Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Cu Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Fe Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Mn Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Mn Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Mo Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Mo Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Ni Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Ni Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Pb Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Pb Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Sb Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Se Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Se Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Sr Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Sr Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Tl Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Tl Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
V Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
V Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-11 11: Trace Metals [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Zn Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Zn Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
1204360-12 12: Mercury [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Hg Diss 7470A	May-17-12 13:40	28	May-18-12 00:00	WP Trace Metals
1204360-13 13: Hexavalent Chromium [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Cr6 Diss 7196A	May-17-12 13:40	28	Apr-21-12 00:00	GOOD WP Hexavalent Chromium
1204360-14 14: Tin and Titanium [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Sn Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Sn Diss 6020	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
Ti Diss 6010B	May-17-12 13:40	28	Oct-17-12 00:00	WP Trace Metals
1204360-15 15: Color [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Color 2120B	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Color
1204360-16 16: Turbidity [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Turbidity 2130 B	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP Turbidity
1204360-17 17: Total Cyanide [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Cyanide, Total 9014	May-17-12 13:40	28	May-04-12 00:00	GOOD WP Total Cyanide
1204360-18 18: Total Phenolics [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Phenolics 9065	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Total Phenolics
1204360-19 19: Sulfide [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Sulfide 9034	May-17-12 13:40	28	Apr-27-12 00:00	GOOD Sulfide
Sulfide, Total 4500-S2 D	May-17-12 13:40	28	Apr-27-12 00:00	GOOD Sulfide
1204360-20 20: MBAS [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
MBAS 5540 C	May-17-12 13:40	28	Apr-22-12 00:00	GOOD WP MBAS
1204360-21 21: Acidity as CaCO3 [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Acidity 2310 B	May-17-12 13:40	28	May-04-12 00:00	GOOD WP Acidity as CaCO3

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-22 22: Bromide [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Bromide 9056A	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Bromide
Bromide D 1246-88	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Bromide
1204360-24 24: Volatiles [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8021B VOAs (master list)	May-17-12 13:40	28	May-04-12 00:00	GOOD WP Volatiles
zz8260B VOAs (master list)	May-17-12 13:40	28	May-04-12 00:00	GOOD WP Volatiles
1204360-25 25: Herbicides [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8151A Herbicides (master list)	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Herbicides
1204360-26 26: PCBs in Water [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8082 PCBs (std 7 aroclors)	May-17-12 13:40	28	Apr-20-13 00:00	GOOD WP PCBs in Water, WP PCBs in Oil
1204360-27 27: PCBs in Oil [Waste] ***Sampled Apr-20-12 00:00 Eastern by***				
8082 PCBs (std 7 aroclors)	May-17-12 13:40	28	Apr-20-13 00:00	GOOD WP PCBs in Water, WP PCBs in Oil
1204360-28 28: Base Neutral Extractables [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
zz8270C SVOCs (master list)	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Base Neutrals
1204360-29 29: Acid Extractables [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8270C SVOCs (FO19)	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Acids
1204360-30 30: Nitroaromatics/Nitroamines [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8330 Explosives DoD	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Nitroaromatics/Nitramines
1204360-31 31: Low Level PAHs SIM [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8270C PNAs - SIM	May-17-12 13:40	28	Apr-27-12 00:00	
1204360-32 32: Organochlorine Pesticides [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8081A PESTs (master list)	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Pesticides, NELAC Pesticides
1204360-33 33: Total Chlordane [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8081A APP IX Pests	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Total Chlordane
1204360-34 34: WP Toxaphene [Water] ***Sampled Apr-20-12 00:00 Eastern by***				

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**
Work Order: **Laboratory Services**

Project Manager: **Rick D. Wilburn**
Project Number: **35508**
SDG:

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-34 34: WP Toxaphene [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8081A MDEQ Pests	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP Toxaphene
1204360-35 35: Total Organic Halides (TOX) [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
TOX 9020B	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Total Organic Halides (TOX)
1204360-36 36: GRO 8015 [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8021B VOAs (BETX)	May-17-12 13:40	28	May-04-12 00:00	
GRO EPA 8015B	May-17-12 13:40	28	May-04-12 00:00	GOOD WP GRO
1204360-37 37: DRO 8015 [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
DRO EPA 8015B	May-17-12 13:40	28	Apr-27-12 00:00	GOOD WP DRO
1204360-38 38: Total Petroleum Hydrocarbons [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
HEM-SGT: TPH 1664A	May-17-12 13:40	28	May-18-12 00:00	GOOD WP Total Petroleum Hydrocarbons
1204360-39 39 Wisconsin GRO [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8021B VOAs (custom2)	May-17-12 13:40	28	May-04-12 00:00	Wisconsin GRO/PVOC
GRO - Wisconsin Method	May-17-12 13:40	28	May-04-12 00:00	
1204360-40 40: Wisconsin DRO [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
DRO - Wisconsin Method	May-17-12 13:40	28	Apr-27-12 00:00	
1204360-41 41: Low Level Mercury [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Hg Total 1631E	May-17-12 13:40	28	May-18-12 00:00	Low Level Mercury
1204360-42 42: Silica as SiO2 [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
Silica, Diss 4500-SiO2 D(low level)	May-17-12 13:40	28	May-18-12 00:00	Silica
1204360-43 OPP Pesticides [Water] ***Sampled Apr-20-12 00:00 Eastern by ERA***				
8270C APP IX PEST	May-17-12 13:40	28	Apr-27-12 00:00	OPP Pesticides
1204360-44 8121 Chlorinated Hydrocarbons [Water] ***Sampled Apr-20-12 00:00 Eastern by***				
8121 Chl. Hydrocarbns (master)	May-17-12 13:40	28	Apr-27-12 00:00	8121 Chlorinated Hydrocarbons
1204360-45 Extra 8270 App IX [Water] ***Sampled Apr-20-12 00:00 Eastern by***				

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
1204360-45 Extra 8270 App IX [Water]				
Sampled Apr-20-12 00:00 Eastern by				
8270C APP IX BNA	May-17-12 13:40	28	Apr-27-12 00:00	Extra 8270 BNA

Analysis groups included in this work order

Hardness 6010B (Calc)

Mg Total 6010B Ca Total 6010B

Reviewed By

Date

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

Inorganic - Wet Chemistry Analysis Detail

* indicates custom

Matrix	Analysis	Unit	MDL	RL
Water	Bromide D 1246-88	mg/L	0.152	0.5
Water	Color 2120B	A.C.U.	5	5
Water	Turbidity 2130 B	NTU	0.2	1
Water	Acidity 2310 B	mg/L	4.02	10
Water	Alkalinity, Total 2320 B	mg/L	0.495	20
Water	Hardness 2340 C (Custom Equation)	mg/L	1.02	2
Water	Solids, Total 2540 B	mg/L	50	50
Water	Solids, TDS 2540 C	mg/L	50	50
Water	Solids, TSS 2540 D	mg/L	3.3	3.3
Water	Solids, Settleable 2540 F	mL/L	0.1	0.1
Water	Fluoride 4500-F C	mg/L	0.0378	0.1
Water	Nitrogen, Ammonia 4500-NH3 G	mg/L	0.0049	0.05
Water	Nitrogen, NO2 4500-NO2 B	mg/L	0.0007	0.01
Water	Nitrogen, Nitrite SM 4500-NO3 F	mg/L	0.0073	0.05
Water	Nitrogen, NO3 4500-NO3 F	mg/L	0.0036	0.05
Water	Nitrogen, NO3+NO2 4500-NO3 F	mg/L	0.0097	0.05
Water	Phosphate, Ortho 4500-P E	mg/L	0.0007	0.01
Water	Phosphorus, Total 4500-P E	mg/L	0.003	0.01
Water	Sulfide, Total 4500-S2 D	mg/L	0.0052	0.02
Water	Silica, Diss 4500-SiO2 D(low level)	mg SiO2/L	0.0211	0.1
Water	BOD 5-Day 5210B	mg/L	1	2
Water	BOD 5-Day Carb 5210 B	mg/L	1	2
Water	COD 5220 D	mg/L	2.35	5
Water	MBAS 5540 C	mg/L	0.0209	0.025
Water	Solids, TVS 160.4 (mg/L)	mg/L	3.3	3.3
Water	HEM: O&G 1664A	mg/L	1.22	5
Water	HEM-SGT: TPH 1664A	mg/L	0.665	10
Water	Nitrogen, TKN 351.2	mg/L	0.0729	0.5
Water	Cr6 Diss 7196A	ug/L	0.0003	0.001
Water	Cyanide, Total 9014	mg/L	0.0029	0.005
Water	TOX 9020B	ug/L as Cl	3.65	10
Water	Sulfide 9034	mg/L	1	1
Water	Sulfate 9038	mg/L	0.282	5
Water	pH 9040B	pH Units		0.1
Water	Conductivity 9050A	umhos/cm	5	5
Water	Bromide 9056A	mg/L	0.0215	0.1
Water	Chloride 9056A	mg/L	0.0568	1
Water	Fluoride 9056A	mg/L	0.0401	0.1
Water	Nitrogen, NO2 9056A	mg/L	0.0268	0.1
Water	Nitrogen, NO3 9056A	mg/L	0.0154	0.1
Water	Sulfate 9056A	mg/L	0.223	2
Water	TOC 9060	mg/L	0.104	0.5
Water	Phenolics 9065	mg/L	0.0025	0.05
Water	Chloride 9251	mg/L	0.502	1

Metals Analysis Detail

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

* indicates custom

	Analysis	Unit	MDL	RL
Water	**USEPA-1631E**			
	Hg Total 1631E	ng/L	0.298	0.5
Water	**USEPA-6010C**			
	Ag Diss 6010B	ug/L	4.08	10
	Al Diss 6010B	ug/L	13.1	50
	As Diss 6010B	ug/L	35	100
	B Diss 6010B	ug/L	15.7	100
	Ba Diss 6010B	ug/L	2.71	10
	Be Diss 6010B	ug/L	0.235	1
	Ca Diss 6010B	mg/L	0.23	0.5
	Ca Total 6010B	mg/L	0.23	0.5
	Cd Diss 6010B	ug/L	2.03	10
	Co Diss 6010B	ug/L	3.56	10
	Cr Diss 6010B	ug/L	4.62	50
	Cu Diss 6010B	ug/L	3.85	10
	Fe Diss 6010B	ug/L	6.53	10
	K Diss 6010B	mg/L	0.0329	0.1
	Mg Diss 6010B	mg/L	0.143	0.5
	Mg Total 6010B	mg/L	0.143	0.5
	Mn Diss 6010B	ug/L	2.78	10
	Mo Diss 6010B	ug/L	22.1	100
	Na Diss 6010B	mg/L	0.127	0.5
	Ni Diss 6010B	ug/L	3.81	10
	Pb Diss 6010B	ug/L	14.6	50
	Se Diss 6010B	ug/L	32.6	100
	Sn Diss 6010B	ug/L	30.8	200
	Sr Diss 6010B	ug/L	13	50
	Ti Diss 6010B	ug/L	21.6	100
	Tl Diss 6010B	ug/L	28.7	100
	V Diss 6010B	ug/L	3.01	10
	Zn Diss 6010B	ug/L	4.89	20
Water	**USEPA-6020A**			
	Ag Diss 6020	ug/L	0.0367	0.2
	Al Diss 6020	ug/L	1.76	10
	As Diss 6020	ug/L	0.177	1
	B Diss 6020	ug/L	1.22	10
	Ba Diss 6020	ug/L	0.136	1
	Be Diss 6020	ug/L	0.111	1
	Cd Diss 6020	ug/L	0.0385	0.2
	Co Diss 6020	ug/L	0.0501	1
	Cr Diss 6020	ug/L	0.195	1
	Cu Diss 6020	ug/L	0.127	1
	Mn Diss 6020	ug/L	0.141	1
	Mo Diss 6020	ug/L	0.0753	1
	Ni Diss 6020	ug/L	0.171	1
	Pb Diss 6020	ug/L	0.152	1
	Sb Diss 6020	ug/L	0.148	1

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

	Se Diss 6020	ug/L	0.31	1
	Sn Diss 6020	ug/L	0.142	10
	Sr Diss 6020	ug/L	0.104	1
	Tl Diss 6020	ug/L	0.0268	1
	V Diss 6020	ug/L	0.0657	1
	Zn Diss 6020	ug/L	1.5	10
Water	**USEPA-7470A**			
	Hg Diss 7470A	ug/L	0.0551	0.2

Semivolatiles GC Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Waste	**8082 PCBs (std 7 aroclors)**			**mg/kg**	
	PCB-1016	Y	Y	0.0123	0.5
	PCB-1221	Y	Y	0.0115	0.5
	PCB-1232	Y	Y	0.0027	0.5
	PCB-1242	Y	Y	0.0106	0.5
	PCB-1248	Y	Y	0.0028	0.5
	PCB-1254	Y	Y	0.0034	0.5
	PCB-1260	Y	Y	0.0049	0.5
Water	**DRO - Wisconsin Method**			**ug/L**	
	DRO (Wisconsin Method)	Y	Y	30	100
Water	**DRO EPA 8015B**			**ug/L**	
	Diesel Range Organics - 8015 (C10-C28)	Y	Y	48.8	200
Water	**8081A APP IX Pests**			**ug/L**	
	Technical Chlordane	Y	Y	0.0082	0.025
Water	**8081A MDEQ Pests**			**ug/L**	
	Toxaphene	Y	Y	0.0067	1
Water	**8081A PESTs (master list)**			**ug/L**	
	alpha-BHC	Y	Y	0.00042	0.01
	beta-BHC	Y	Y	0.00204	0.01
	gamma-BHC (Lindane)	Y	Y	0.00047	0.01
	delta-BHC	Y	Y	0.00057	0.01
	alpha-Chlordane	Y	Y	0.00017	0.01
	gamma-Chlordane	Y	Y	0.0003	0.01
	4,4'-DDD	Y	Y	0.00019	0.01
	4,4'-DDE	Y	Y	0.00017	0.01
	4,4'-DDT	Y	Y	0.00017	0.01
	Aldrin	Y	Y	0.00058	0.01
	Dieldrin	Y	Y	0.00046	0.01
	Endosulfan I	Y	Y	0.00028	0.01
	Endosulfan II	Y	Y	0.00028	0.01
	Endosulfan Sulfate	Y	Y	0.00033	0.01
	Endrin	Y	Y	0.00039	0.01
	Endrin Aldehyde	Y	Y	0.00234	0.01
	Endrin Ketone	Y	Y	0.00275	0.02
	Heptachlor	Y	Y	0.00055	0.01
	Heptachlor Epoxide	Y	Y	0.00028	0.01
	Methoxychlor	Y	Y	0.00068	0.01
Water	**8082 PCBs (std 7 aroclors)**			**ug/L**	

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Work Order:	**Laboratory Services**	SDG:	

	PCB-1016	Y	Y	0.0537	0.2
	PCB-1221	Y	Y	0.0454	0.2
	PCB-1232	Y	Y	0.0409	0.2
	PCB-1242	Y	Y	0.0619	0.2
	PCB-1248	Y	Y	0.0544	0.2
	PCB-1254	Y	Y	0.0532	0.2
	PCB-1260	Y	Y	0.0291	0.2
Water	**8121 Chl. Hydrocarbns (master)**			**ug/L**	
	1,3-Dichlorobenzene	Y	Y	0.0346	1
	1,4-Dichlorobenzene	Y	Y	0.025	1
	1,2-Dichlorobenzene	Y	Y	0.0463	1
	Hexachloroethane	Y	Y	0.0045	1
	1,2,4-Trichlorobenzene	Y	Y	0.0017	2
	Hexachlorobutadiene	Y	Y	0.0036	0.01
	1,2,4,5-Tetrachlorobenzene	Y	Y	0.0017	0.02
	Hexachlorocyclopentadiene	Y	Y	0.0034	0.01
	2-Chloronaphthalene	Y	Y	0.25	2
	Pentachlorobenzene	Y	Y	0.001	0.01
	Hexachlorobenzene	Y	Y	0.0021	0.01
Water	**8151A Herbicides (master list)**			**ug/L**	
	2,4-D	Y	Y	0.194	5
	2,4,5-T	Y	Y	0.038	5
	2,4,5-TP (Silvex)	Y	Y	0.0095	5
	2,4-DB	Y	Y	0.276	2
	Dalapon	Y	Y	0.523	2
	Dicamba	Y	Y	0.025	0.5
	Dichloroprop	Y	Y	0.016	0.5
	Dinoseb	Y	Y	0.182	0.5
	MCPA	Y	Y	14.3	75
	MCPP	Y	Y	12.2	75
Water	**8330 Explosives DoD**			**ug/L**	
	1,3,5-Trinitrobenzene	Y	Y	0.469	5
	1,3-Dinitrobenzene	Y	Y	0.144	5
	2,4,6-Trinitrotoluene	Y	Y	0.16	5
	2,4-Dinitrotoluene	Y	Y	0.52	5
	2,6-Dinitrotoluene	Y	Y	0.256	5
	2-Amino-4,6-dinitrotoluene	Y	Y	1.04	5
	2-Nitrotoluene	Y	Y	0.271	5
	3-Nitrotoluene	Y	Y	0.133	5
	4-Amino-2,6-dinitrotoluene	Y	Y	0.231	5
	4-Nitrotoluene	Y	Y	0.52	5
	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	Y	Y	0.489	5
	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	Y	Y	0.194	5
	Nitrobenzene	Y	Y	0.161	5
	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	Y	Y	0.131	5

Semivolatiles MS Analysis Detail

* indicates custom

	Analyte	CLrept?	QCrept?	MDL	RL
Water	**8270C APP IX BNA**			**ug/L**	
	1,3-Dinitrobenzene	Y	Y	0.0788	2
	1,3,5-Trinitrobenzene	Y	Y	0.5	2

Client: **Environmental Resource Associates**
Project Manager: **Rick D. Wilburn**
Project: **WP PT Samples Spring**
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Water	**8270C APP IX PEST**			**ug/L**	
	Disulfoton	Y	Y	0.25	2
	Methyl Parathion	Y	Y	0.199	2
	Parathion	Y	Y	0.173	2
	Phorate	Y	Y	0.25	2
Water	**8270C SVOCs (FO19)**			**ug/L**	
	Benzoic Acid	Y	Y	0.211	1
	4-Chloro-3-methylphenol	Y	Y	0.166	0.5
	2-Chlorophenol	Y	Y	0.0703	0.5
	2,4-Dichlorophenol	Y	Y	0.232	0.5
	2,6-Dichlorophenol	Y	Y	0.195	0.5
	2,4-Dimethylphenol	Y	Y	0.309	1
	4,6-Dinitro-2-methylphenol	Y	Y	0.145	0.5
	2,4-Dinitrophenol	Y	Y	1.8	5
	2-Methylphenol	Y	Y	0.126	0.5
	3+4-Methylphenol	Y	Y	0.113	5
	4-Nitrophenol	Y	Y	0.71	5
	2-Nitrophenol	Y	Y	0.0677	0.5
	Pentachlorophenol	Y	Y	0.094	0.5
	Phenol	Y	Y	0.146	0.5
	2,3,4,6-Tetrachlorophenol	Y	Y	0.289	5
	2,4,5-Trichlorophenol	Y	Y	0.0298	0.5
	2,4,6-Trichlorophenol	Y	Y	0.0646	0.5
Water	**zz8270C SVOCs (master list)**			**ug/L**	
	Acenaphthene	Y	Y	0.0299	0.5
	Acenaphthylene	Y	Y	0.0204	0.5
	Aniline	Y	Y	0.0434	0.5
	Anthracene	Y	Y	0.0363	0.5
	Benzidine	Y	Y	1.42	10
	Benzo(a)anthracene	Y	Y	0.0222	0.5
	Benzo(a)pyrene	Y	Y	0.0418	0.5
	Benzo(b)fluoranthene	Y	Y	0.114	0.5
	Benzo(k)fluoranthene	Y	Y	0.124	0.5
	Benzo(g,h,i)perylene	Y	Y	0.0984	0.5
	Benzyl Alcohol	Y	Y	0.166	0.5
	4-Bromophenyl Phenyl Ether	Y	Y	0.0356	0.5
	Butyl Benzyl Phthalate	Y	Y	0.0575	1
	Carbazole	Y	Y	0.047	0.5
	4-Chloroaniline	Y	Y	0.15	1
	Bis(2-chloroethoxy)methane	Y	Y	0.035	0.5
	Bis(2-chloroethyl) Ether	Y	Y	0.035	0.5
	Bis(2-chloroisopropyl) Ether	Y	Y	0.0594	0.5
	2-Chloronaphthalene	Y	Y	0.029	0.5
	4-Chlorophenyl Phenyl Ether	Y	Y	0.0314	0.5
	Chrysene	Y	Y	0.0356	0.5
	Dibenz(a,h)anthracene	Y	Y	0.0699	0.5
	Dibenzofuran	Y	Y	0.039	0.5
	Di-n-butyl Phthalate	Y	Y	0.267	1
	1,2-Dichlorobenzene	Y	Y	0.0675	0.5
	1,3-Dichlorobenzene	Y	Y	0.0299	0.5
	1,4-Dichlorobenzene	Y	Y	0.024	0.5
	3,3´-Dichlorobenzidine	Y	Y	0.641	5
	Diethyl Phthalate	Y	Y	0.0434	5

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	Dimethyl Phthalate	Y	Y	0.0446	0.5
	2,4-Dinitrotoluene	Y	Y	0.096	0.5
	2,6-Dinitrotoluene	Y	Y	0.134	0.5
	Di-n-octyl Phthalate	Y	Y	0.0642	1
	Bis(2-ethylhexyl) Phthalate	Y	Y	0.242	1
	Fluoranthene	Y	Y	0.0299	0.5
	Fluorene	Y	Y	0.0314	0.5
	Hexachlorobenzene	Y	Y	0.0621	0.5
	Hexachlorobutadiene	Y	Y	0.0321	0.5
	Hexachlorocyclopentadiene	Y	Y	0.0566	0.5
	Hexachloroethane	Y	Y	0.035	0.5
	Indeno(1,2,3-cd)pyrene	Y	Y	0.0378	0.5
	Isophorone	Y	Y	0.0557	0.5
	2-Methylnaphthalene	Y	Y	0.0238	0.5
	1-Methylnaphthalene	Y	Y	0.0283	0.5
	Naphthalene	Y	Y	0.0238	0.5
	2-Nitroaniline	Y	Y	0.155	1
	3-Nitroaniline	Y	Y	0.0495	1
	4-Nitroaniline	Y	Y	0.0699	1
	Nitrobenzene	Y	Y	0.0764	0.5
	N-Nitroso-diethylamine	Y	Y	0.5	2
	N-Nitroso-dimethylamine	Y	Y	0.341	0.5
	N-Nitroso-diphenylamine	Y	Y	0.042	0.5
	N-Nitroso-di-n-propylamine	Y	Y	0.0444	0.5
	Pentachlorobenzene	Y	Y	0.256	2
	Phenanthrene	Y	Y	0.0308	0.5
	Pyrene	Y	Y	0.0217	0.5
	Pyridine	Y	Y	0.217	0.5
	1,2,4,5-Tetrachlorobenzene	Y	Y	0.0181	2
	o-Toluidine	Y	Y	0.142	2
	1,2,4-Trichlorobenzene	Y	Y	0.0247	0.5
Water	**8270C PNAs - SIM**			**ug/L**	
	Acenaphthene	Y	Y	0.02	0.06
	Acenaphthylene	Y	Y	0.02	0.06
	Anthracene	Y	Y	0.01	0.05
	Benzo(a)anthracene	Y	Y	0.0109	0.05
	Benzo(a)pyrene	Y	Y	0.0087	0.05
	Benzo(b)fluoranthene	Y	Y	0.0125	0.05
	Benzo(g,h,i)perylene	Y	Y	0.0111	0.05
	Benzo(k)fluoranthene	Y	Y	0.0108	0.05
	Chrysene	Y	Y	0.0136	0.05
	Dibenz(a,h)anthracene	Y	Y	0.0111	0.05
	Fluoranthene	Y	Y	0.006	0.05
	Fluorene	Y	Y	0.0076	0.05
	Indeno(1,2,3-cd)pyrene	Y	Y	0.0112	0.05
	Naphthalene	Y	Y	0.02	0.06
	Phenanthrene	Y	Y	0.02	0.06
	Pyrene	Y	Y	0.012	0.05

Volatiles GC Analysis Detail

* indicates custom

Analyte	CLrept?	QCrept?	MDL	RL

Client: **Environmental Resource Associates** Project Manager: **Rick D. Wilburn**
Project: **WP PT Samples Spring** Project Number: **35508**
Work Order: **Laboratory Services** SDG:

Water	**GRO - Wisconsin Method**			**ug/L**	
	Gasoline Range Organics (Wisconsin Method)	Y	Y	12.5	100
Water	**GRO EPA 8015B**			**ug/L**	
	GRO - 8015 (C6-C10)	Y	Y	24	100
Water	**8021B VOAs (BETX)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Ethylbenzene	Y	Y	0.304	1
	Toluene	Y	Y	0.27	1
	Xylene (Total)	Y	Y	0.906	3
Water	**8021B VOAs (custom2)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Ethylbenzene	Y	Y	0.304	1
	Methyl tert-Butyl Ether	Y	Y	0.2	5
	Naphthalene	Y	Y	0.182	1
	Toluene	Y	Y	0.27	1
	1,3,5-Trimethylbenzene	Y	Y	0.285	1
	1,2,4-Trimethylbenzene	Y	Y	0.299	1
	Xylene (Total)	Y	Y	0.906	3
	Xylene, Meta + Para	Y	Y	0.602	2
	Xylene, Ortho	Y	Y	0.304	1
Water	**8021B VOAs (master list)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Bromodichloromethane	Y	Y	0.264	1
	Bromoform	Y	Y	0.216	1
	Bromomethane	Y	Y	0.271	1
	Carbon Tetrachloride	Y	Y	0.258	1
	Chlorobenzene	Y	Y	0.254	1
	Chloroethane	Y	Y	0.231	1
	2-Chloroethyl Vinyl Ether	Y	Y	0.145	10
	Chloroform	Y	Y	0.285	1
	Chloromethane	Y	Y	0.415	1
	1,2-Dibromo-3-chloropropane	Y	Y	0.173	1
	Dibromochloromethane	Y	Y	0.289	1
	1,2-Dibromoethane	Y	Y	0.228	1
	Dibromomethane	Y	Y	0.223	1
	1,3-Dichlorobenzene	Y	Y	2	2
	1,2-Dichlorobenzene	Y	Y	2	2
	1,4-Dichlorobenzene	Y	Y	0.223	1
	Dichlorodifluoromethane	Y	Y	0.255	1
	1,1-Dichloroethane	Y	Y	0.328	1
	1,2-Dichloroethane	Y	Y	0.25	1
	cis-1,2-Dichloroethene	Y	Y	0.294	1
	trans-1,2-Dichloroethene	Y	Y	0.255	1
	1,1-Dichloroethene	Y	Y	0.232	1
	1,2-Dichloropropane	Y	Y	0.226	1
	trans-1,3-Dichloropropene	Y	Y	1	1
	cis-1,3-Dichloropropene	Y	Y	0.216	1
	Ethylbenzene	Y	Y	0.304	1
	Hexachlorobutadiene	Y	Y	0.185	1
	Methylene Chloride	Y	Y	5	5
	Methyl tert-Butyl Ether	Y	Y	0.2	5
	Naphthalene	Y	Y	0.182	1

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

	Styrene	Y	Y	0.306	1
	1,1,2,2-Tetrachloroethane	Y	Y	0.291	1
	1,1,1,2-Tetrachloroethane	Y	Y	0.304	1
	Tetrachloroethene	Y	Y	0.284	1
	Toluene	Y	Y	0.27	1
	1,2,4-Trichlorobenzene	Y	Y	0.258	1
	1,1,2-Trichloroethane	Y	Y	0.254	1
	1,1,1-Trichloroethane	Y	Y	0.293	1
	Trichloroethene	Y	Y	0.238	1
	Trichlorofluoromethane	Y	Y	0.233	1
	1,2,3-Trichloropropane	Y	Y	0.196	1
	Vinyl Chloride	Y	Y	0.216	1
	Xylene (Total)	Y	Y	0.906	3
	Xylene, Meta + Para	Y	Y	0.602	2
	Xylene, Ortho	Y	Y	0.304	1

Volatiles MS Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Water	**zz8260B VOAs (master list)**			**ug/L**	
	Acetone	Y	Y	1.09	5
	Acetonitrile	Y	Y	2.45	5
	Acrolein	Y	Y	0.788	5
	Acrylonitrile	Y	Y	0.188	1
	Benzene	Y	Y	0.114	1
	Bromodichloromethane	Y	Y	0.128	1
	Bromoform	Y	Y	0.257	1
	Bromomethane	Y	Y	0.214	1
	Carbon Disulfide	Y	Y	0.231	5
	Carbon Tetrachloride	Y	Y	0.265	1
	Chlorobenzene	Y	Y	0.167	1
	Chloroethane	Y	Y	0.143	1
	2-Chloroethyl Vinyl Ether	Y	Y	0.32	5
	Chloroform	Y	Y	0.0975	1
	Chloromethane	Y	Y	0.289	1
	1,2-Dibromo-3-chloropropane	Y	Y	0.128	1
	Dibromochloromethane	Y	Y	0.152	1
	1,2-Dibromoethane	Y	Y	0.152	1
	Dibromomethane	Y	Y	0.257	1
	1,2-Dichlorobenzene	Y	Y	0.236	1
	1,3-Dichlorobenzene	Y	Y	0.238	1
	1,4-Dichlorobenzene	Y	Y	0.25	1
	Dichlorodifluoromethane	Y	Y	0.214	1
	1,1-Dichloroethane	Y	Y	0.185	1
	1,2-Dichloroethane	Y	Y	0.213	1
	1,1-Dichloroethene	Y	Y	0.21	1
	cis-1,2-Dichloroethene	Y	Y	0.121	1
	trans-1,2-Dichloroethene	Y	Y	0.202	1
	1,2-Dichloropropane	Y	Y	0.276	1
	cis-1,3-Dichloropropene	Y	Y	0.19	1
	trans-1,3-Dichloropropene	Y	Y	0.187	1
	Ethylbenzene	Y	Y	0.206	1
	Hexachlorobutadiene	Y	Y	0.241	1

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Work Order:	**Laboratory Services**	SDG:	

2-Hexanone	Y	Y	0.493	5
Methyl tert-Butyl Ether	Y	Y	0.19	1
Methylene Chloride	Y	Y	0.245	1
2-Butanone (MEK)	Y	Y	0.63	5
4-Methyl-2-pentanone (MIBK)	Y	Y	0.395	5
Naphthalene	Y	Y	0.282	5
Styrene	Y	Y	0.205	1
1,1,1,2-Tetrachloroethane	Y	Y	0.136	1
1,1,2,2-Tetrachloroethane	Y	Y	0.255	1
Tetrachloroethene	Y	Y	0.226	1
Toluene	Y	Y	0.185	1
1,2,4-Trichlorobenzene	Y	Y	0.126	1
1,1,1-Trichloroethane	Y	Y	0.138	1
1,1,2-Trichloroethane	Y	Y	0.203	1
Trichloroethene	Y	Y	0.212	1
Trichlorofluoromethane	Y	Y	0.266	1
1,2,3-Trichloropropane	Y	Y	0.279	1
Vinyl Acetate	Y	Y	0.414	5
Vinyl Chloride	Y	Y	0.209	1
Xylene, Meta + Para	Y	Y	0.283	2
Xylene, Ortho	Y	Y	0.11	1
Xylene (Total)	Y	Y	0.393	3

Appendix V

Inorganic - Wet Chemistry Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
1204360-01	**1: Minerals**	**Water**	**Apr-20-12 00:00 Eastern**			
	Alkalinity, Total 2320 B		28	May-04-12 00:00	May-17-12 13:40	ERA WP Minerals
	Chloride 9056A		28	May-18-12 00:00	May-17-12 13:40	ERA WP Minerals
	Chloride 9251		28	May-18-12 00:00	May-17-12 13:40	
	Conductivity 9050A		28	May-18-12 00:00	May-17-12 13:40	ERA WP Minerals
	Fluoride 4500-F C		28	May-18-12 00:00	May-17-12 13:40	Delete Fluoride sample and ADD to Minerals
	Fluoride 9056A		28	May-18-12 00:00	May-17-12 13:40	Delete Fluoride sample and ADD to Minerals
	Solids, TDS 2540 C		28	Apr-27-12 00:00	May-17-12 13:40	Remove from WP Solids but leave in WP Minerals
	Solids, Total 2540 B		28	Apr-27-12 00:00	May-17-12 13:40	Remove from WP Solids and add to WP Minerals
	Sulfate 9038		28	May-18-12 00:00	May-17-12 13:40	ERA WP Minerals
	Sulfate 9056A		28	May-18-12 00:00	May-17-12 13:40	ERA WP Minerals
1204360-02	**2: Hardness**	**Water**	**Apr-20-12 00:00 Eastern**			
	Hardness 2340 C (Custom Equation)		19	Oct-17-12 00:00	May-16-12 17:00	
	Solids, TSS 2540 D		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Solids
1204360-03	**3: pH**	**Water**	**Apr-20-12 00:00 Eastern**			
	pH 9040B		28	Apr-20-12 00:00	May-17-12 13:40	GOOD WP pH
1204360-04	**4: Settleable Solids**	**Water**	**Apr-20-12 00:00 Eastern**			
	Solids, Settleable 2540 F		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Settleable Solids
1204360-05	**5: Volatile Solids**	**Water**	**Apr-20-12 00:00 Eastern**			
	Solids, TVS 160.4 (mg/L)		28	Apr-27-12 00:00	May-17-12 13:40	
1204360-06	**6: Simple Nutrients**	**Water**	**Apr-20-12 00:00 Eastern**			
	Nitrogen, Ammonia 4500-NH3 G		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Nutrients
	Nitrogen, NO3 4500-NO3 F		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nutrients
	Nitrogen, NO3 9056A		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nutrients
	Nitrogen, NO3+NO2 4500-NO3 F		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Nitrate-Nitrite as N
	Phosphate, Ortho 4500-P E		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nutrients
1204360-07	**7: Complex Nutrients**	**Water**	**Apr-20-12 00:00 Eastern**			
	Nitrogen, TKN 351.2		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Nutrients
	Phosphorus, Total 4500-P E		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Nutrients
1204360-08	**8: Nitrite as N**	**Water**	**Apr-20-12 00:00 Eastern**			
	Nitrogen, Nitrite SM 4500-NO3 F		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nitrite as N
	Nitrogen, NO2 4500-NO2 B		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nitrite as N
	Nitrogen, NO2 9056A		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Nitrite as N

Inorganic - Wet Chemistry Sample Receipt Notice

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
1204360-09	**9: Demand**	**Water**	**Apr-20-12 00:00 Eastern**			
	BOD 5-Day 5210B		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Demand
	BOD 5-Day Carb 5210 B		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Demand
	COD 5220 D		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Demand
	TOC 9060		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Demand
1204360-10	**10: Oil & Grease**	**Water**	**Apr-20-12 00:00 Eastern**			
	HEM: O&G 1664A		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Oil & Grease
1204360-13	**13: Hexavalent Chromium**	**Water**	**Apr-20-12 00:00 Eastern**			
	Cr6 Diss 7196A		28	Apr-21-12 00:00	May-17-12 13:40	GOOD WP Hexavalent Chromium
1204360-15	**15: Color**	**Water**	**Apr-20-12 00:00 Eastern**			
	Color 2120B		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Color
1204360-16	**16: Turbidity**	**Water**	**Apr-20-12 00:00 Eastern**			
	Turbidity 2130 B		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP Turbidity
1204360-17	**17: Total Cyanide**	**Water**	**Apr-20-12 00:00 Eastern**			
	Cyanide, Total 9014		28	May-04-12 00:00	May-17-12 13:40	GOOD WP Total Cyanide
1204360-18	**18: Total Phenolics**	**Water**	**Apr-20-12 00:00 Eastern**			
	Phenolics 9065		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Total Phenolics
1204360-19	**19: Sulfide**	**Water**	**Apr-20-12 00:00 Eastern**			
	Sulfide 9034		28	Apr-27-12 00:00	May-17-12 13:40	GOOD Sulfide
	Sulfide, Total 4500-S2 D		28	Apr-27-12 00:00	May-17-12 13:40	GOOD Sulfide
1204360-20	**20: MBAS**	**Water**	**Apr-20-12 00:00 Eastern**			
	MBAS 5540 C		28	Apr-22-12 00:00	May-17-12 13:40	GOOD WP MBAS
1204360-21	**21: Acidity as CaCO3**	**Water**	**Apr-20-12 00:00 Eastern**			
	Acidity 2310 B		28	May-04-12 00:00	May-17-12 13:40	GOOD WP Acidity as CaCO3
1204360-22	**22: Bromide**	**Water**	**Apr-20-12 00:00 Eastern**			
	Bromide 9056A		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Bromide
	Bromide D 1246-88		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Bromide
1204360-35	**35: Total Organic Halides (TO**	**Water**	**Apr-20-12 00:00 Eastern**			
	TOX 9020B		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Total Organic Halides (TOX)
1204360-38	**38: Total Petroleum Hydrocar**	**Water**	**Apr-20-12 00:00 Eastern**			
	HEM-SGT: TPH 1664A		28	May-18-12 00:00	May-17-12 13:40	GOOD WP Total Petroleum Hydrocarbons
1204360-42	**42: Silica as SiO2**	**Water**	**Apr-20-12 00:00 Eastern**			
	Silica, Diss 4500-SiO2 D(low level)		28	May-18-12 00:00	May-17-12 13:40	Silica

Inorganic - Wet Chemistry Analysis Detail

* indicates custom

Matrix	Analysis	Unit	MDL	RL
Water	Bromide D 1246-88	mg/L	0.152	0.5
Water	Color 2120B	A.C.U.	5	5
Water	Turbidity 2130 B	NTU	0.2	1
Water	Acidity 2310 B	mg/L	4.02	10
Water	Alkalinity, Total 2320 B	mg/L	0.495	20
Water	Hardness 2340 C (Custom Equation)	mg/L	1.02	2
Water	Solids, Total 2540 B	mg/L	50	50
Water	Solids, TDS 2540 C	mg/L	50	50
Water	Solids, TSS 2540 D	mg/L	3.3	3.3
Water	Solids, Settleable 2540 F	mL/L	0.1	0.1
Water	Fluoride 4500-F C	mg/L	0.0378	0.1
Water	Nitrogen, Ammonia 4500-NH3 G	mg/L	0.0049	0.05
Water	Nitrogen, NO2 4500-NO2 B	mg/L	0.0007	0.01
Water	Nitrogen, Nitrite SM 4500-NO3 F	mg/L	0.0073	0.05
Water	Nitrogen, NO3 4500-NO3 F	mg/L	0.0036	0.05
Water	Nitrogen, NO3+NO2 4500-NO3 F	mg/L	0.0097	0.05
Water	Phosphate, Ortho 4500-P E	mg/L	0.0007	0.01
Water	Phosphorus, Total 4500-P E	mg/L	0.003	0.01
Water	Sulfide, Total 4500-S2 D	mg/L	0.0052	0.02
Water	Silica, Diss 4500-SiO2 D(low level)	mg SiO2/L	0.0211	0.1
Water	BOD 5-Day 5210B	mg/L	1	2
Water	BOD 5-Day Carb 5210 B	mg/L	1	2
Water	COD 5220 D	mg/L	2.35	5
Water	MBAS 5540 C	mg/L	0.0209	0.025
Water	Solids, TVS 160.4 (mg/L)	mg/L	3.3	3.3
Water	HEM: O&G 1664A	mg/L	1.22	5
Water	HEM-SGT: TPH 1664A	mg/L	0.665	10
Water	Nitrogen, TKN 351.2	mg/L	0.0729	0.5
Water	Cr6 Diss 7196A	ug/L	0.0003	0.001
Water	Cyanide, Total 9014	mg/L	0.0029	0.005
Water	TOX 9020B	ug/L as Cl	3.65	10
Water	Sulfide 9034	mg/L	1	1
Water	Sulfate 9038	mg/L	0.282	5
Water	pH 9040B	pH Units		0.1
Water	Conductivity 9050A	umhos/cm	5	5
Water	Bromide 9056A	mg/L	0.0215	0.1
Water	Chloride 9056A	mg/L	0.0568	1
Water	Fluoride 9056A	mg/L	0.0401	0.1
Water	Nitrogen, NO2 9056A	mg/L	0.0268	0.1
Water	Nitrogen, NO3 9056A	mg/L	0.0154	0.1
Water	Sulfate 9056A	mg/L	0.223	2
Water	TOC 9060	mg/L	0.104	0.5
Water	Phenolics 9065	mg/L	0.0025	0.05
Water	Chloride 9251	mg/L	0.502	1

Metals Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
1204360-01	**1: Minerals**	**Water**	**Apr-20-12 00:00 Eastern**			
	K Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	ERA WP Minerals
	Na Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	ERA WP Minerals
1204360-02	**2: Hardness**	**Water**	**Apr-20-12 00:00 Eastern**			
	Ca Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	REMOVE from Minerals
	Ca Total 6010B		10	Oct-17-12 00:00	May-17-12 13:40	
	Mg Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	REMOVE from Minerals
	Mg Total 6010B		10	Oct-17-12 00:00	May-17-12 13:40	
1204360-11	**11: Trace Metals**	**Water**	**Apr-20-12 00:00 Eastern**			
	Ag Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Ag Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Al Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Al Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	
	As Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	As Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	B Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	B Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Ba Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Ba Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Be Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Be Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cd Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cd Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Co Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Co Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cr Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cr Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cu Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Cu Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Fe Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Mn Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Mn Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Mo Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Mo Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Ni Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals

Metals Sample Receipt Notice

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
	Ni Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Pb Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Pb Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Sb Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Se Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Se Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Sr Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Sr Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Tl Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Tl Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	V Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	V Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Zn Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Zn Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
1204360-12	**12: Mercury**	**Water**	**Apr-20-12 00:00 Eastern**			
	Hg Diss 7470A		28	May-18-12 00:00	May-17-12 13:40	WP Trace Metals
1204360-14	**14: Tin and Titanium**	**Water**	**Apr-20-12 00:00 Eastern**			
	Sn Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Sn Diss 6020		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
	Ti Diss 6010B		28	Oct-17-12 00:00	May-17-12 13:40	WP Trace Metals
1204360-41	**41: Low Level Mercury**	**Water**	**Apr-20-12 00:00 Eastern**			
	Hg Total 1631E		28	May-18-12 00:00	May-17-12 13:40	Low Level Mercury

Metals Analysis Detail

* indicates custom

	Analysis	Unit	MDL	RL
Water	**USEPA-1631E**			
	Hg Total 1631E	ng/L	0.298	0.5
Water	**USEPA-6010C**			
	Ag Diss 6010B	ug/L	4.08	10
	Al Diss 6010B	ug/L	13.1	50
	As Diss 6010B	ug/L	35	100
	B Diss 6010B	ug/L	15.7	100
	Ba Diss 6010B	ug/L	2.71	10
	Be Diss 6010B	ug/L	0.235	1
	Ca Diss 6010B	mg/L	0.23	0.5
	Ca Total 6010B	mg/L	0.23	0.5
	Cd Diss 6010B	ug/L	2.03	10
	Co Diss 6010B	ug/L	3.56	10
	Cr Diss 6010B	ug/L	4.62	50
	Cu Diss 6010B	ug/L	3.85	10
	Fe Diss 6010B	ug/L	6.53	10
	K Diss 6010B	mg/L	0.0329	0.1
	Mg Diss 6010B	mg/L	0.143	0.5
	Mg Total 6010B	mg/L	0.143	0.5
	Mn Diss 6010B	ug/L	2.78	10
	Mo Diss 6010B	ug/L	22.1	100
	Na Diss 6010B	mg/L	0.127	0.5
	Ni Diss 6010B	ug/L	3.81	10
	Pb Diss 6010B	ug/L	14.6	50
	Se Diss 6010B	ug/L	32.6	100
	Sn Diss 6010B	ug/L	30.8	200
	Sr Diss 6010B	ug/L	13	50
	Ti Diss 6010B	ug/L	21.6	100
	Tl Diss 6010B	ug/L	28.7	100
	V Diss 6010B	ug/L	3.01	10
	Zn Diss 6010B	ug/L	4.89	20
Water	**USEPA-6020A**			
	Ag Diss 6020	ug/L	0.0367	0.2
	Al Diss 6020	ug/L	1.76	10
	As Diss 6020	ug/L	0.177	1
	B Diss 6020	ug/L	1.22	10
	Ba Diss 6020	ug/L	0.136	1
	Be Diss 6020	ug/L	0.111	1
	Cd Diss 6020	ug/L	0.0385	0.2
	Co Diss 6020	ug/L	0.0501	1
	Cr Diss 6020	ug/L	0.195	1
	Cu Diss 6020	ug/L	0.127	1
	Mn Diss 6020	ug/L	0.141	1
	Mo Diss 6020	ug/L	0.0753	1
	Ni Diss 6020	ug/L	0.171	1
	Pb Diss 6020	ug/L	0.152	1
	Sb Diss 6020	ug/L	0.148	1
	Se Diss 6020	ug/L	0.31	1
	Sn Diss 6020	ug/L	0.142	10
	Sr Diss 6020	ug/L	0.104	1

Metals Analysis Detail

* indicates custom

	Analysis	Unit	MDL	RL
	Tl Diss 6020	ug/L	0.0268	1
	V Diss 6020	ug/L	0.0657	1
	Zn Diss 6020	ug/L	1.5	10
Water	**USEPA-7470A**			
	Hg Diss 7470A	ug/L	0.0551	0.2

Semivolatiles GC Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments: Lab Due Date	Comments
1204360-25	**25: Herbicides**	**Water**	**Apr-20-12 00:00 Eastern**			
	8151A Herbicides (master list)		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Herbicides
1204360-26	**26: PCBs in Water**	**Water**	**Apr-20-12 00:00 Eastern**			
	8082 PCBs (std 7 aroclors)		28	Apr-20-13 00:00	May-17-12 13:40	GOOD WP PCBs in Water, WP PCBs in Oil
1204360-27	**27: PCBs in Oil**	**Waste**	**Apr-20-12 00:00 Eastern**			
	8082 PCBs (std 7 aroclors)		28	Apr-20-13 00:00	May-17-12 13:40	GOOD WP PCBs in Water, WP PCBs in Oil
1204360-30	**30: Nitroaromatics/Nitroamine**	**Water**	**Apr-20-12 00:00 Eastern**			
	8330 Explosives DoD		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Nitroaromatics/Nitramines
1204360-32	**32: Organochlorine Pesticides**	**Water**	**Apr-20-12 00:00 Eastern**			
	8081A PESTs (master list)		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Pesticides, NELAC Pesticides
1204360-33	**33: Total Chlordane**	**Water**	**Apr-20-12 00:00 Eastern**			
	8081A APP IX Pests		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Total Chlordane
1204360-34	**34: WP Toxaphene**	**Water**	**Apr-20-12 00:00 Eastern**			
	8081A MDEQ Pests		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Toxaphene
1204360-37	**37: DRO 8015**	**Water**	**Apr-20-12 00:00 Eastern**			
	DRO EPA 8015B		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP DRO
1204360-40	**40: Wisconsin DRO**	**Water**	**Apr-20-12 00:00 Eastern**			
	DRO - Wisconsin Method		28	Apr-27-12 00:00	May-17-12 13:40	
1204360-44	**8121 Chlorinated Hydrocarbo**	**Water**	**Apr-20-12 00:00 Eastern**			
	8121 Chl. Hydrocarbns (master)		28	Apr-27-12 00:00	May-17-12 13:40	8121 Chlorinated Hydrocarbons

Semivolatiles GC Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Waste	**8082 PCBs (std 7 aroclors)**			**mg/kg**	
	PCB-1016	Y	Y	0.0123	0.5
	PCB-1221	Y	Y	0.0115	0.5
	PCB-1232	Y	Y	0.0027	0.5
	PCB-1242	Y	Y	0.0106	0.5
	PCB-1248	Y	Y	0.0028	0.5
	PCB-1254	Y	Y	0.0034	0.5
	PCB-1260	Y	Y	0.0049	0.5
Water	**DRO - Wisconsin Method**			**ug/L**	
	DRO (Wisconsin Method)	Y	Y	30	100
Water	**DRO EPA 8015B**			**ug/L**	
	Diesel Range Organics - 8015 (C10-C28)	Y	Y	48.8	200
Water	**8081A APP IX Pests**			**ug/L**	
	Technical Chlordane	Y	Y	0.0082	0.025
Water	**8081A MDEQ Pests**			**ug/L**	
	Toxaphene	Y	Y	0.0067	1
Water	**8081A PESTs (master list)**			**ug/L**	
	alpha-BHC	Y	Y	0.00042	0.01
	beta-BHC	Y	Y	0.00204	0.01
	gamma-BHC (Lindane)	Y	Y	0.00047	0.01
	delta-BHC	Y	Y	0.00057	0.01
	alpha-Chlordane	Y	Y	0.00017	0.01
	gamma-Chlordane	Y	Y	0.0003	0.01
	4,4'-DDD	Y	Y	0.00019	0.01
	4,4'-DDE	Y	Y	0.00017	0.01
	4,4'-DDT	Y	Y	0.00017	0.01
	Aldrin	Y	Y	0.00058	0.01
	Dieldrin	Y	Y	0.00046	0.01
	Endosulfan I	Y	Y	0.00028	0.01
	Endosulfan II	Y	Y	0.00028	0.01
	Endosulfan Sulfate	Y	Y	0.00033	0.01
	Endrin	Y	Y	0.00039	0.01
	Endrin Aldehyde	Y	Y	0.00234	0.01
	Endrin Ketone	Y	Y	0.00275	0.02
	Heptachlor	Y	Y	0.00055	0.01
	Heptachlor Epoxide	Y	Y	0.00028	0.01
	Methoxychlor	Y	Y	0.00068	0.01
Water	**8082 PCBs (std 7 aroclors)**			**ug/L**	
	PCB-1016	Y	Y	0.0537	0.2
	PCB-1221	Y	Y	0.0454	0.2
	PCB-1232	Y	Y	0.0409	0.2
	PCB-1242	Y	Y	0.0619	0.2
	PCB-1248	Y	Y	0.0544	0.2
	PCB-1254	Y	Y	0.0532	0.2
	PCB-1260	Y	Y	0.0291	0.2
Water	**8121 Chl. Hydrocarbns (master)**			**ug/L**	
	1,3-Dichlorobenzene	Y	Y	0.0346	1
	1,4-Dichlorobenzene	Y	Y	0.025	1

Semivolatiles GC Analysis Detail

* indicates custom

	Analyte	CLrept?	QCrept?	MDL	RL
	1,2-Dichlorobenzene	Y	Y	0.0463	1
	Hexachloroethane	Y	Y	0.0045	1
	1,2,4-Trichlorobenzene	Y	Y	0.0017	2
	Hexachlorobutadiene	Y	Y	0.0036	0.01
	1,2,4,5-Tetrachlorobenzene	Y	Y	0.0017	0.02
	Hexachlorocyclopentadiene	Y	Y	0.0034	0.01
	2-Chloronaphthalene	Y	Y	0.25	2
	Pentachlorobenzene	Y	Y	0.001	0.01
	Hexachlorobenzene	Y	Y	0.0021	0.01
Water	**8151A Herbicides (master list)**			**ug/L**	
	2,4-D	Y	Y	0.194	5
	2,4,5-T	Y	Y	0.038	5
	2,4,5-TP (Silvex)	Y	Y	0.0095	5
	2,4-DB	Y	Y	0.276	2
	Dalapon	Y	Y	0.523	2
	Dicamba	Y	Y	0.025	0.5
	Dichloroprop	Y	Y	0.016	0.5
	Dinoseb	Y	Y	0.182	0.5
	MCPA	Y	Y	14.3	75
	MCPP	Y	Y	12.2	75
Water	**8330 Explosives DoD**			**ug/L**	
	1,3,5-Trinitrobenzene	Y	Y	0.469	5
	1,3-Dinitrobenzene	Y	Y	0.144	5
	2,4,6-Trinitrotoluene	Y	Y	0.16	5
	2,4-Dinitrotoluene	Y	Y	0.52	5
	2,6-Dinitrotoluene	Y	Y	0.256	5
	2-Amino-4,6-dinitrotoluene	Y	Y	1.04	5
	2-Nitrotoluene	Y	Y	0.271	5
	3-Nitrotoluene	Y	Y	0.133	5
	4-Amino-2,6-dinitrotoluene	Y	Y	0.231	5
	4-Nitrotoluene	Y	Y	0.52	5
	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	Y	Y	0.489	5
	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	Y	Y	0.194	5
	Nitrobenzene	Y	Y	0.161	5
	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	Y	Y	0.131	5

Semivolatiles MS Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments: Lab Due Date	Comments
1204360-28	**28: Base Neutral Extractables**	**Water**	**Apr-20-12 00:00 Eastern**			
	zz8270C SVOCs (master list)		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Base Neutrals
1204360-29	**29: Acid Extractables**	**Water**	**Apr-20-12 00:00 Eastern**			
	8270C SVOCs (FO19)		28	Apr-27-12 00:00	May-17-12 13:40	GOOD WP Acids
1204360-31	**31: Low Level PAHs SIM**	**Water**	**Apr-20-12 00:00 Eastern**			
	8270C PNAs - SIM		28	Apr-27-12 00:00	May-17-12 13:40	
1204360-43	**OPP Pesticides**	**Water**	**Apr-20-12 00:00 Eastern**			
	8270C APP IX PEST		28	Apr-27-12 00:00	May-17-12 13:40	OPP Pesticides
1204360-45	**Extra 8270 App IX**	**Water**	**Apr-20-12 00:00 Eastern**			
	8270C APP IX BNA		28	Apr-27-12 00:00	May-17-12 13:40	Extra 8270 BNA

Semivolatiles MS Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Water	**8270C APP IX BNA**			**ug/L**	
	1,3-Dinitrobenzene	Y	Y	0.0788	2
	1,3,5-Trinitrobenzene	Y	Y	0.5	2
Water	**8270C APP IX PEST**			**ug/L**	
	Disulfoton	Y	Y	0.25	2
	Methyl Parathion	Y	Y	0.199	2
	Parathion	Y	Y	0.173	2
	Phorate	Y	Y	0.25	2
Water	**8270C SVOCs (FO19)**			**ug/L**	
	Benzoic Acid	Y	Y	0.211	1
	4-Chloro-3-methylphenol	Y	Y	0.166	0.5
	2-Chlorophenol	Y	Y	0.0703	0.5
	2,4-Dichlorophenol	Y	Y	0.232	0.5
	2,6-Dichlorophenol	Y	Y	0.195	0.5
	2,4-Dimethylphenol	Y	Y	0.309	1
	4,6-Dinitro-2-methylphenol	Y	Y	0.145	0.5
	2,4-Dinitrophenol	Y	Y	1.8	5
	2-Methylphenol	Y	Y	0.126	0.5
	3+4-Methylphenol	Y	Y	0.113	5
	4-Nitrophenol	Y	Y	0.71	5
	2-Nitrophenol	Y	Y	0.0677	0.5
	Pentachlorophenol	Y	Y	0.094	0.5
	Phenol	Y	Y	0.146	0.5
	2,3,4,6-Tetrachlorophenol	Y	Y	0.289	5
	2,4,5-Trichlorophenol	Y	Y	0.0298	0.5
	2,4,6-Trichlorophenol	Y	Y	0.0646	0.5
Water	**zz8270C SVOCs (master list)**			**ug/L**	
	Acenaphthene	Y	Y	0.0299	0.5
	Acenaphthylene	Y	Y	0.0204	0.5
	Aniline	Y	Y	0.0434	0.5
	Anthracene	Y	Y	0.0363	0.5
	Benzidine	Y	Y	1.42	10
	Benzo(a)anthracene	Y	Y	0.0222	0.5
	Benzo(a)pyrene	Y	Y	0.0418	0.5
	Benzo(b)fluoranthene	Y	Y	0.114	0.5
	Benzo(k)fluoranthene	Y	Y	0.124	0.5
	Benzo(g,h,i)perylene	Y	Y	0.0984	0.5
	Benzyl Alcohol	Y	Y	0.166	0.5
	4-Bromophenyl Phenyl Ether	Y	Y	0.0356	0.5
	Butyl Benzyl Phthalate	Y	Y	0.0575	1
	Carbazole	Y	Y	0.047	0.5
	4-Chloroaniline	Y	Y	0.15	1
	Bis(2-chloroethoxy)methane	Y	Y	0.035	0.5
	Bis(2-chloroethyl) Ether	Y	Y	0.035	0.5
	Bis(2-chloroisopropyl) Ether	Y	Y	0.0594	0.5
	2-Chloronaphthalene	Y	Y	0.029	0.5
	4-Chlorophenyl Phenyl Ether	Y	Y	0.0314	0.5
	Chrysene	Y	Y	0.0356	0.5
	Dibenz(a,h)anthracene	Y	Y	0.0699	0.5
	Dibenzofuran	Y	Y	0.039	0.5

Semivolatiles MS Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
	Di-n-butyl Phthalate	Y	Y	0.267	1
	1,2-Dichlorobenzene	Y	Y	0.0675	0.5
	1,3-Dichlorobenzene	Y	Y	0.0299	0.5
	1,4-Dichlorobenzene	Y	Y	0.024	0.5
	3,3´-Dichlorobenzidine	Y	Y	0.641	5
	Diethyl Phthalate	Y	Y	0.0434	5
	Dimethyl Phthalate	Y	Y	0.0446	0.5
	2,4-Dinitrotoluene	Y	Y	0.096	0.5
	2,6-Dinitrotoluene	Y	Y	0.134	0.5
	Di-n-octyl Phthalate	Y	Y	0.0642	1
	Bis(2-ethylhexyl) Phthalate	Y	Y	0.242	1
	Fluoranthene	Y	Y	0.0299	0.5
	Fluorene	Y	Y	0.0314	0.5
	Hexachlorobenzene	Y	Y	0.0621	0.5
	Hexachlorobutadiene	Y	Y	0.0321	0.5
	Hexachlorocyclopentadiene	Y	Y	0.0566	0.5
	Hexachloroethane	Y	Y	0.035	0.5
	Indeno(1,2,3-cd)pyrene	Y	Y	0.0378	0.5
	Isophorone	Y	Y	0.0557	0.5
	2-Methylnaphthalene	Y	Y	0.0238	0.5
	1-Methylnaphthalene	Y	Y	0.0283	0.5
	Naphthalene	Y	Y	0.0238	0.5
	2-Nitroaniline	Y	Y	0.155	1
	3-Nitroaniline	Y	Y	0.0495	1
	4-Nitroaniline	Y	Y	0.0699	1
	Nitrobenzene	Y	Y	0.0764	0.5
	N-Nitroso-diethylamine	Y	Y	0.5	2
	N-Nitroso-dimethylamine	Y	Y	0.341	0.5
	N-Nitroso-diphenylamine	Y	Y	0.042	0.5
	N-Nitroso-di-n-propylamine	Y	Y	0.0444	0.5
	Pentachlorobenzene	Y	Y	0.256	2
	Phenanthrene	Y	Y	0.0308	0.5
	Pyrene	Y	Y	0.0217	0.5
	Pyridine	Y	Y	0.217	0.5
	1,2,4,5-Tetrachlorobenzene	Y	Y	0.0181	2
	o-Toluidine	Y	Y	0.142	2
	1,2,4-Trichlorobenzene	Y	Y	0.0247	0.5
Water	**8270C PNAs - SIM**			**ug/L**	
	Acenaphthene	Y	Y	0.02	0.06
	Acenaphthylene	Y	Y	0.02	0.06
	Anthracene	Y	Y	0.01	0.05
	Benzo(a)anthracene	Y	Y	0.0109	0.05
	Benzo(a)pyrene	Y	Y	0.0087	0.05
	Benzo(b)fluoranthene	Y	Y	0.0125	0.05
	Benzo(g,h,i)perylene	Y	Y	0.0111	0.05
	Benzo(k)fluoranthene	Y	Y	0.0108	0.05
	Chrysene	Y	Y	0.0136	0.05
	Dibenz(a,h)anthracene	Y	Y	0.0111	0.05
	Fluoranthene	Y	Y	0.006	0.05
	Fluorene	Y	Y	0.0076	0.05
	Indeno(1,2,3-cd)pyrene	Y	Y	0.0112	0.05

Semivolatiles MS Analysis Detail

* indicates custom

Analyte	CLrept?	QCrept?	MDL	RL
Naphthalene	Y	Y	0.02	0.06
Phenanthrene	Y	Y	0.02	0.06
Pyrene	Y	Y	0.012	0.05

Volatiles GC Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	TAT	Sampled Date / Expire Date	Sample Comments / Lab Due Date	Comments
1204360-24	**24: Volatiles**	**Water**	**Apr-20-12 00:00 Eastern**			
	8021B VOAs (master list)		28	May-04-12 00:00	May-17-12 13:40	GOOD WP Volatiles
1204360-36	**36: GRO 8015**	**Water**	**Apr-20-12 00:00 Eastern**			
	8021B VOAs (BETX)		28	May-04-12 00:00	May-17-12 13:40	
	GRO EPA 8015B		28	May-04-12 00:00	May-17-12 13:40	GOOD WP GRO
1204360-39	**39 Wisconsin GRO**	**Water**	**Apr-20-12 00:00 Eastern**			
	8021B VOAs (custom2)		28	May-04-12 00:00	May-17-12 13:40	Wisconsin GRO/PVOC
	GRO - Wisconsin Method		28	May-04-12 00:00	May-17-12 13:40	

Volatiles GC Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Water	**GRO - Wisconsin Method**			**ug/L**	
	Gasoline Range Organics (Wisconsin Method)	Y	Y	12.5	100
Water	**GRO EPA 8015B**			**ug/L**	
	GRO - 8015 (C6-C10)	Y	Y	24	100
Water	**8021B VOAs (BETX)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Ethylbenzene	Y	Y	0.304	1
	Toluene	Y	Y	0.27	1
	Xylene (Total)	Y	Y	0.906	3
Water	**8021B VOAs (custom2)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Ethylbenzene	Y	Y	0.304	1
	Methyl tert-Butyl Ether	Y	Y	0.2	5
	Naphthalene	Y	Y	0.182	1
	Toluene	Y	Y	0.27	1
	1,3,5-Trimethylbenzene	Y	Y	0.285	1
	1,2,4-Trimethylbenzene	Y	Y	0.299	1
	Xylene (Total)	Y	Y	0.906	3
	Xylene, Meta + Para	Y	Y	0.602	2
	Xylene, Ortho	Y	Y	0.304	1
Water	**8021B VOAs (master list)**			**ug/L**	
	Benzene	Y	Y	0.3	1
	Bromodichloromethane	Y	Y	0.264	1
	Bromoform	Y	Y	0.216	1
	Bromomethane	Y	Y	0.271	1
	Carbon Tetrachloride	Y	Y	0.258	1
	Chlorobenzene	Y	Y	0.254	1
	Chloroethane	Y	Y	0.231	1
	2-Chloroethyl Vinyl Ether	Y	Y	0.145	10
	Chloroform	Y	Y	0.285	1
	Chloromethane	Y	Y	0.415	1
	1,2-Dibromo-3-chloropropane	Y	Y	0.173	1
	Dibromochloromethane	Y	Y	0.289	1
	1,2-Dibromoethane	Y	Y	0.228	1
	Dibromomethane	Y	Y	0.223	1
	1,3-Dichlorobenzene	Y	Y	2	2
	1,2-Dichlorobenzene	Y	Y	2	2
	1,4-Dichlorobenzene	Y	Y	0.223	1
	Dichlorodifluoromethane	Y	Y	0.255	1
	1,1-Dichloroethane	Y	Y	0.328	1
	1,2-Dichloroethane	Y	Y	0.25	1
	cis-1,2-Dichloroethene	Y	Y	0.294	1
	trans-1,2-Dichloroethene	Y	Y	0.255	1
	1,1-Dichloroethene	Y	Y	0.232	1
	1,2-Dichloropropane	Y	Y	0.226	1
	trans-1,3-Dichloropropene	Y	Y	1	1
	cis-1,3-Dichloropropene	Y	Y	0.216	1
	Ethylbenzene	Y	Y	0.304	1
	Hexachlorobutadiene	Y	Y	0.185	1

Volatiles GC Analysis Detail

* indicates custom

Analyte	CLrept?	QCrept?	MDL	RL
Methylene Chloride	Y	Y	5	5
Methyl tert-Butyl Ether	Y	Y	0.2	5
Naphthalene	Y	Y	0.182	1
Styrene	Y	Y	0.306	1
1,1,2,2-Tetrachloroethane	Y	Y	0.291	1
1,1,1,2-Tetrachloroethane	Y	Y	0.304	1
Tetrachloroethene	Y	Y	0.284	1
Toluene	Y	Y	0.27	1
1,2,4-Trichlorobenzene	Y	Y	0.258	1
1,1,2-Trichloroethane	Y	Y	0.254	1
1,1,1-Trichloroethane	Y	Y	0.293	1
Trichloroethene	Y	Y	0.238	1
Trichlorofluoromethane	Y	Y	0.233	1
1,2,3-Trichloropropane	Y	Y	0.196	1
Vinyl Chloride	Y	Y	0.216	1
Xylene (Total)	Y	Y	0.906	3
Xylene, Meta + Para	Y	Y	0.602	2
Xylene, Ortho	Y	Y	0.304	1

Volatiles MS Sample Receipt Notice

Client:	**Environmental Resource Associates**	Project Manager:	**Rick D. Wilburn**
Project:	**WP PT Samples Spring**	Project Number:	**35508**
Client Due Date:	**May-17-12 23:00 (19 day TAT)**	Report Level:	**3MD**
W.O. Comments:	*QC is 3MD; full list spike*		

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
1204360-24	**24: Volatiles**	**Water**	**Apr-20-12 00:00 Eastern**			
	zz8260B VOAs (master list)		28	May-04-12 00:00	May-17-12 13:40	GOOD WP Volatiles

Volatiles MS Analysis Detail

	Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Water	**zz8260B VOAs (master list)**			**ug/L**	
	Acetone	Y	Y	1.09	5
	Acetonitrile	Y	Y	2.45	5
	Acrolein	Y	Y	0.788	5
	Acrylonitrile	Y	Y	0.188	1
	Benzene	Y	Y	0.114	1
	Bromodichloromethane	Y	Y	0.128	1
	Bromoform	Y	Y	0.257	1
	Bromomethane	Y	Y	0.214	1
	Carbon Disulfide	Y	Y	0.231	5
	Carbon Tetrachloride	Y	Y	0.265	1
	Chlorobenzene	Y	Y	0.167	1
	Chloroethane	Y	Y	0.143	1
	2-Chloroethyl Vinyl Ether	Y	Y	0.32	5
	Chloroform	Y	Y	0.0975	1
	Chloromethane	Y	Y	0.289	1
	1,2-Dibromo-3-chloropropane	Y	Y	0.128	1
	Dibromochloromethane	Y	Y	0.152	1
	1,2-Dibromoethane	Y	Y	0.152	1
	Dibromomethane	Y	Y	0.257	1
	1,2-Dichlorobenzene	Y	Y	0.236	1
	1,3-Dichlorobenzene	Y	Y	0.238	1
	1,4-Dichlorobenzene	Y	Y	0.25	1
	Dichlorodifluoromethane	Y	Y	0.214	1
	1,1-Dichloroethane	Y	Y	0.185	1
	1,2-Dichloroethane	Y	Y	0.213	1
	1,1-Dichloroethene	Y	Y	0.21	1
	cis-1,2-Dichloroethene	Y	Y	0.121	1
	trans-1,2-Dichloroethene	Y	Y	0.202	1
	1,2-Dichloropropane	Y	Y	0.276	1
	cis-1,3-Dichloropropene	Y	Y	0.19	1
	trans-1,3-Dichloropropene	Y	Y	0.187	1
	Ethylbenzene	Y	Y	0.206	1
	Hexachlorobutadiene	Y	Y	0.241	1
	2-Hexanone	Y	Y	0.493	5
	Methyl tert-Butyl Ether	Y	Y	0.19	1
	Methylene Chloride	Y	Y	0.245	1
	2-Butanone (MEK)	Y	Y	0.63	5
	4-Methyl-2-pentanone (MIBK)	Y	Y	0.395	5
	Naphthalene	Y	Y	0.282	5
	Styrene	Y	Y	0.205	1
	1,1,1,2-Tetrachloroethane	Y	Y	0.136	1
	1,1,2,2-Tetrachloroethane	Y	Y	0.255	1
	Tetrachloroethene	Y	Y	0.226	1
	Toluene	Y	Y	0.185	1
	1,2,4-Trichlorobenzene	Y	Y	0.126	1
	1,1,1-Trichloroethane	Y	Y	0.138	1
	1,1,2-Trichloroethane	Y	Y	0.203	1
	Trichloroethene	Y	Y	0.212	1
	Trichlorofluoromethane	Y	Y	0.266	1
	1,2,3-Trichloropropane	Y	Y	0.279	1

Volatiles MS Analysis Detail

* indicates custom

Analyte	CLrept?	QCrept?	MDL	RL
Vinyl Acetate	Y	Y	0.414	5
Vinyl Chloride	Y	Y	0.209	1
Xylene, Meta + Para	Y	Y	0.283	2
Xylene, Ortho	Y	Y	0.11	1
Xylene (Total)	Y	Y	0.393	3

Appendix W

TriMatrix Laboratories, Inc. - Department

Work Orders Received Sep-01-11 to Sep-30-11 - Printed May-04-12 13:13 by TCB

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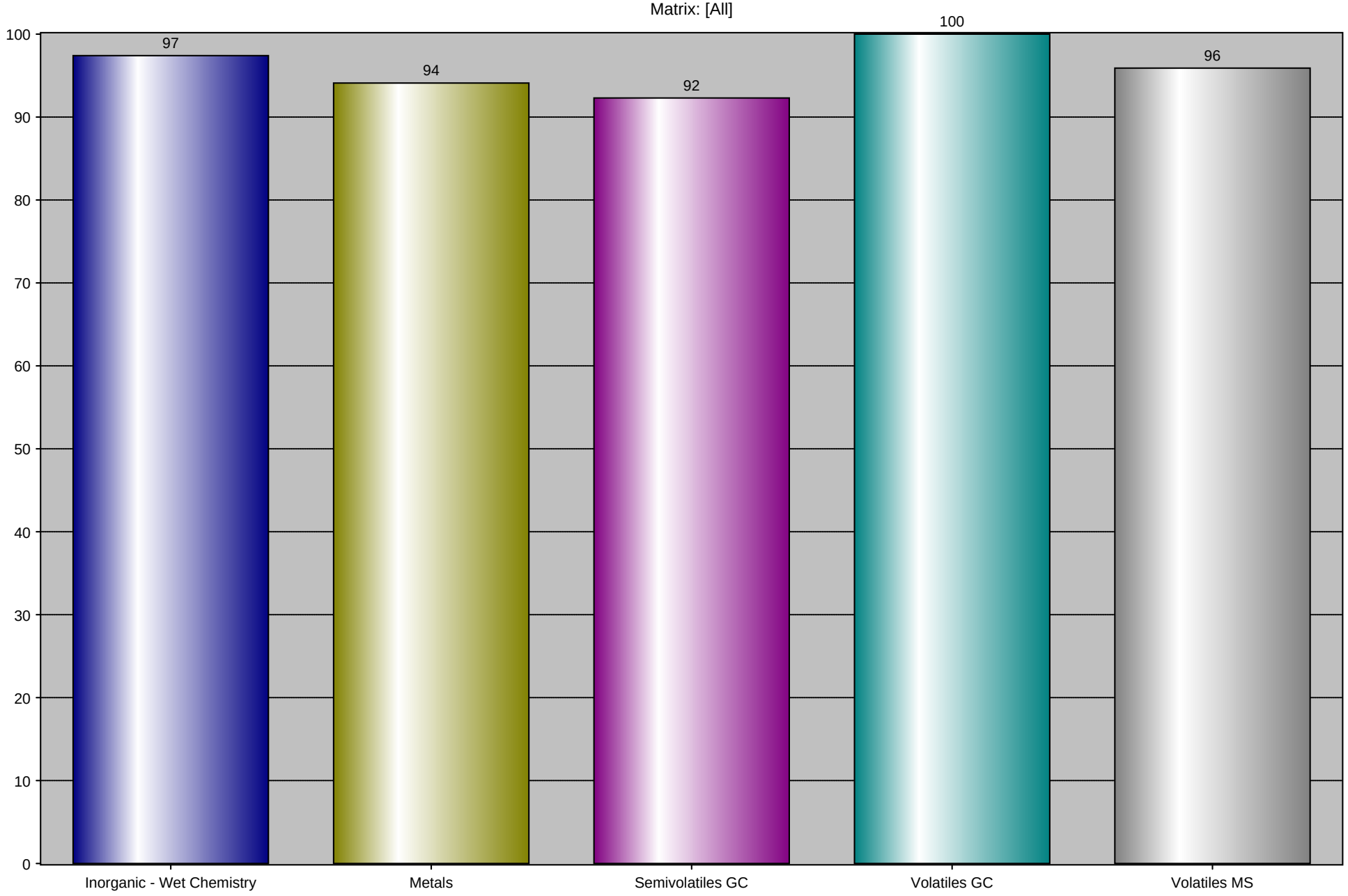
Department	Samples	Analyses	Price	Surcharge	Total
Inorganic - Wet Chemistry	1646	4889	$75,257.16	$280.25	$75,537.41
Metals	1586	13064	$116,546.70	$17.00	$116,563.70
Semivolatiles GC	463	483	$36,195.00	$180.00	$36,375.00
Semivolatiles MS	527	549	$59,170.00	$0.00	$59,170.00
Volatiles GC	85	85	$2,945.00	$0.00	$2,945.00
Volatiles MS	1264	1329	$108,462.10	$162.00	$108,624.10
****TOTALS****	**5571**	**20399**	**$398,575.96**	**$639.25**	**$399,215.21**

TriMatrix Laboratories, Inc. - % On-Time by Department [Apr-01-11 to Apr-28-11]
Printed May-04-12 15:01 by RDW
Department: Inorganic - Wet Chemistry, Metals, Semivolatiles GC, Volatiles GC, Volatiles MS
Analysis: [All]
Matrix: [All]

Department	On-Time	Total	%
Inorganic - Wet Chemistry	4458	4576	97.4
Metals	13676	14533	94.1
Semivolatiles GC	262	284	92.3
Volatiles GC	27	27	100
Volatiles MS	1494	1558	95.9

TriMatrix Laboratories, Inc. - % On-Time by Department [Apr-01-11 to Apr-28-11]

Printed May-04-12 15:00 by RDW
Department: Inorganic - Wet Chemistry, Metals, Semivolatiles GC, Volatiles GC, Volatiles MS
Analysis: [All]
Matrix: [All]



Lab PM (Rick D. Wilburn) Jan-01-11 - Dec-31-11

Available,Cancelled,Completed,Invoiced,Preliminary,Received,Reported

Work Order	Done	RptLvl	Pending	Status	Client	Project Name (Number)	PMgr	TAT	Received	Due
1101323	118/118	3MD		Completed	Environmental Resource Associates	Semi-Annual Solid PE Study (35338)	RDW	19	Jan-31-11	Feb-25-11
1102035	1/1	3MD		Completed	Environmental Resource Associates	ERA WS PT Samples (35005)	RDW	11	Feb-03-11	Feb-18-11
1102146	59/59	3MD		Completed	Environmental Resource Associates	ERA WS PT Samples (35005)	RDW	20	Feb-14-11	Mar-14-11
1102182	170/170	3MD		Completed	State of New York	Department of Health PT Samples (36229)	RDW	10	Feb-17-11	Mar-03-11
1102307	75/75	3MD		Completed	TriMatrix Laboratories, Inc.	pH Strip Testing (36236)	RDW	10	Feb-28-11	Mar-14-11
1103267	3/3	3MD		Completed	TriMatrix Laboratories, Inc.	pH Strip Testing (36236)	RDW	10	Mar-21-11	Apr-04-11
1104034	82/82	3MD		Completed	Environmental Resource Associates	DMRQA Testing (36330)	RDW	30	Apr-04-11	May-16-11
1104286	117/117	3MD		Completed	Environmental Resource Associates	WP PT Samples Spring (35508)	RDW	20	Apr-18-11	May-16-11
1105086	48/48	2RL		Completed	TriMatrix Laboratories, Inc.	Stericup Filter Certification ([none])	RDW	10	May-04-11	May-18-11
1105247	15/15	3MD		Completed	Environmental Resource Associates	ERA WS PT Samples (35005)	RDW	11	May-12-11	May-27-11
1105248	5/5	3MD		Completed	RTC	RTC PT SAMPLES ([none])	RDW	11	May-12-11	May-27-11
1107092	60/60	3MD		Completed	Environmental Resource Associates	ERA WS PT Samples (35005)	RDW	17	Jul-11-11	Aug-03-11
1107234	4/4	3MD		Completed	Environmental Resource Associates	WP PT Samples Spring (35508)	RDW	10	Jul-18-11	Aug-01-11
1107251	169/169	3MD		Completed	State of New York	Department of Health PT Samples (36229)	RDW	17	Jul-19-11	Aug-11-11
1107279	120/120	3MD		Completed	Environmental Resource Associates	Semi-Annual Solid PE Study (35338)	RDW	18	Jul-20-11	Aug-15-11
1108243	46/46	3MD		Completed	TriMatrix Laboratories, Inc.	pH Strip Testing (36236)	RDW	10	Aug-16-11	Aug-30-11
1108311	48/48	1RL		Completed	TriMatrix Laboratories, Inc.	Stericup Filter Certification ([none])	RDW	10	Aug-18-11	Sep-01-11
1109257	15/15	3MD		Completed	Environmental Resource Associates	ERA WS PT Samples (35005)	RDW	21	Sep-19-11	Oct-18-11
1109409	2/2	3MD		Completed	Environmental Resource Associates	Semi-Annual Solid PE Study (35338)	RDW	10	Sep-28-11	Oct-12-11
1110362	2/2	3MD		Completed	Environmental Resource Associates	Semi-Annual Solid PE Study (35338)	RDW	10	Oct-19-11	Nov-02-11
1110364	9/9	3MD		Completed	RTC	RTC UST and TCLP SOIL ([none])	RDW	23	Oct-19-11	Nov-21-11
1110420	118/118	3MD		Completed	Environmental Resource Associates	WP PT Samples Fall (35508)	RDW	15	Oct-21-11	Nov-11-11

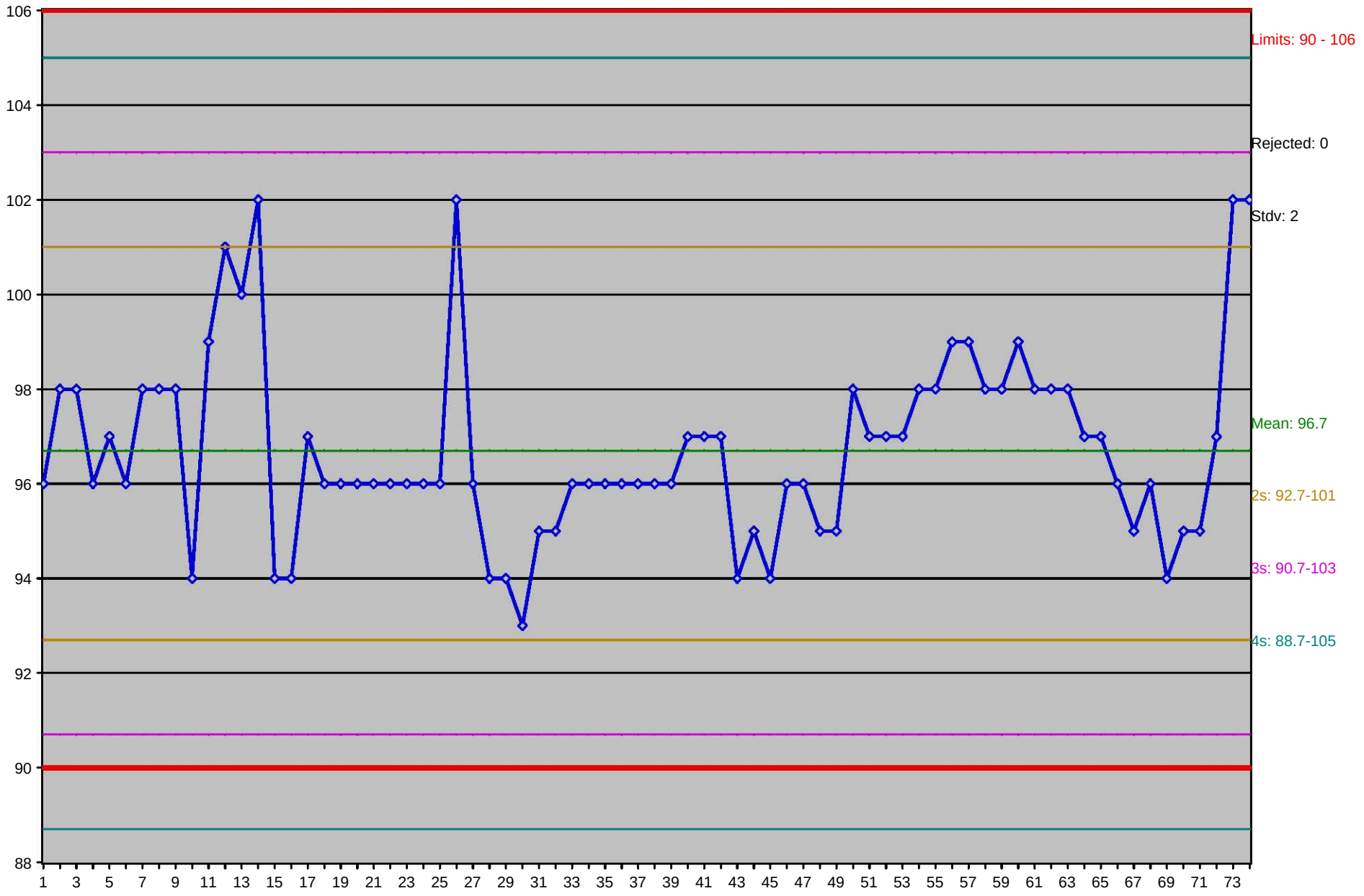
Lab PM (Rick D. Wilburn) Jan-01-11 - Dec-31-11

yzed,Available,Batched,Cancelled,Entered,Hold,Invoiced,Leached,Prepared,Received,Reported,Reviewed,Subcontr

Lab Number	Analysis	Matrix	RptLev	RTAT	Due	Expires	Status	Client	Project	Sample [Analysis] Comments
1101323-01	Ag Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Ag Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Al Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	As Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	As Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	B Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	B Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Ba Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Ba Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Be Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Be Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Ca Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cd Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cd Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Co Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Co Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cr Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cr Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cu Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Cu Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Fe Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Hg Total 7471A	Soil	3MD	18	Feb-24-11	Feb-27-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	K Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Mg Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Mn Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Mn Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Mo Total 6010B	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]
1101323-01	Mo Total 6020	Soil	3MD	18	Feb-24-11	Jul-29-11	Reported	Environmental Resource Assoc	Semi-Annual Solid PE Study	[metals]

Appendix X

LAB: TriMatrix Laboratories, Inc.
CHART: LCS %R
ANALYTE: CHLORIDE
ANALYSES: Chloride 4500-Cl E
MATRICES: Soil, Waste Water, Water
PRINTED: May-04-12 12:21 by RDW
All Clients/Projects [11/1/2011 to 12/31/2011 11:59:59 PM]



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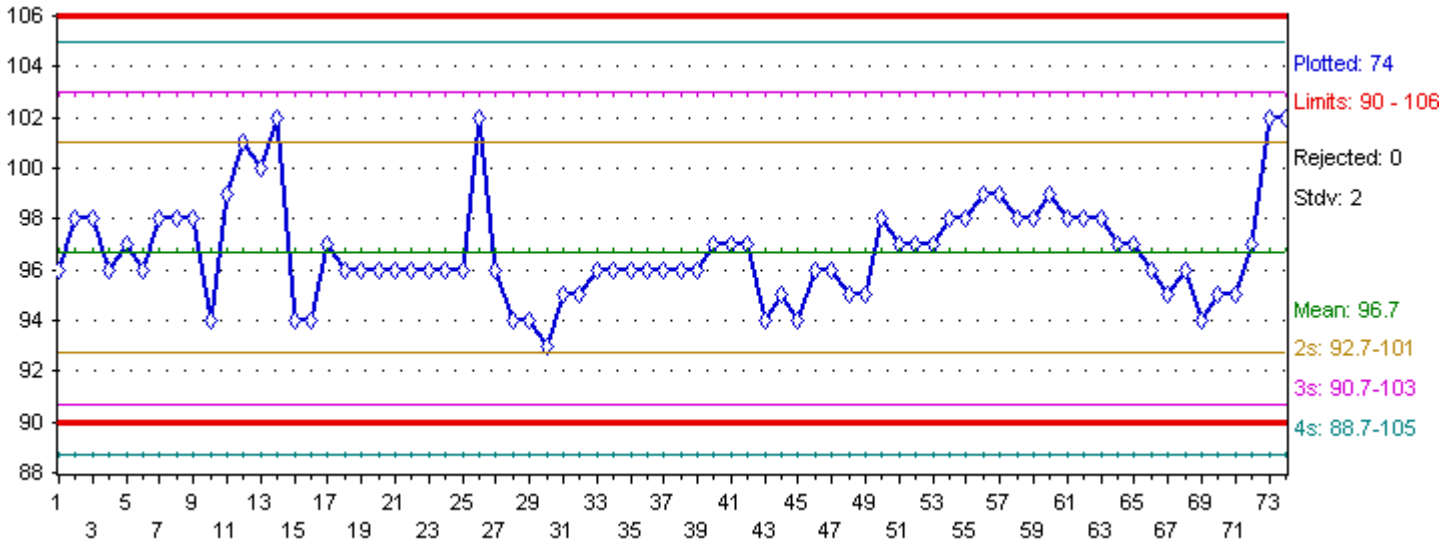
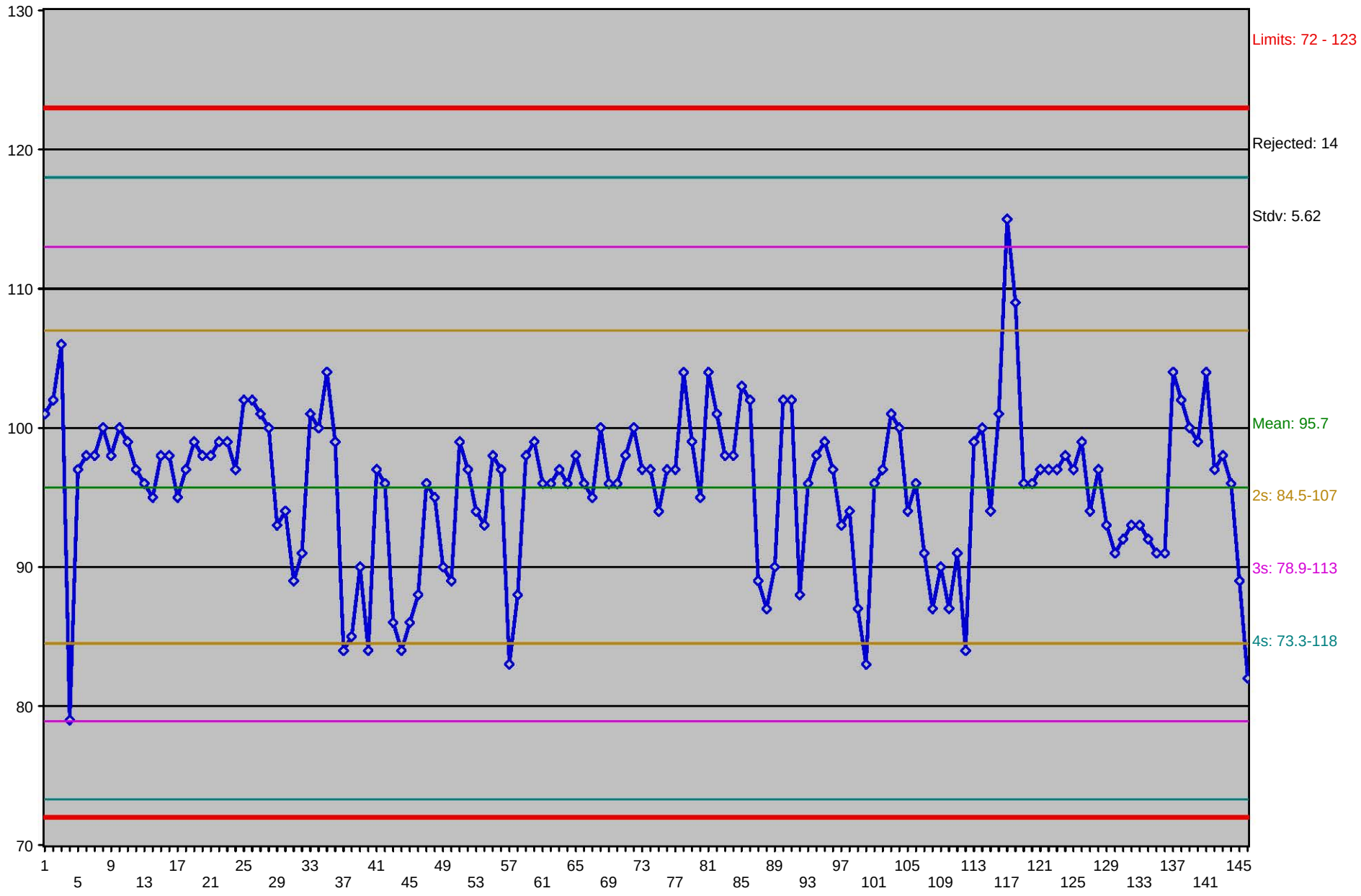
Project:	All Projects	Prepared By:	All Extractionists
Analyses:	Chloride 4500-Cl E	Analyzed By:	All Analysts
		Extractions:	All Extractions

Chloride ***LCS %R***



Rjct	Sample ID	Prepared	Analyzed	Spike Level	Result	%R	Limits	Qualifiers
	1112157-BS1	11/1/11	11/1/11	50	47.9	96	90-106	
	1112158-BS1	11/1/11	11/1/11	50	48.8	98	90-106	
	1112159-BS1	11/1/11	11/1/11	50	48.9	98	90-106	
	1112162-BS1	11/1/11	11/1/11	50	48.1	96	90-106	
	1112160-BS1	11/1/11	11/1/11	50	48.4	97	90-106	
	1112161-BS1	11/1/11	11/1/11	50	48	96	90-106	
	1112247-BS1	11/2/11	11/2/11	50	49.2	98	90-106	
	1112249-BS1	11/2/11	11/2/11	50	49.2	98	90-106	
	1112248-BS1	11/2/11	11/2/11	50	49	98	90-106	
	1112400-BS1	11/4/11	11/4/11	50	46.9	94	90-106	
	1112424-BS1	11/5/11	11/5/11	50	49.6	99	90-106	
	1112425-BS1	11/5/11	11/5/11	50	50.3	101	90-106	
	1112431-BS1	11/5/11	11/5/11	50	50.1	100	90-106	
	1112430-BS1	11/5/11	11/5/11	50	51	102	90-106	
	1112483-BS1	11/7/11	11/7/11	50	47.1	94	90-106	
	1112486-BS1	11/7/11	11/7/11	50	47.1	94	90-106	
	1112485-BS1	11/7/11	11/7/11	50	48.7	97	90-106	
	1112668-BS1	11/9/11	11/9/11	50	48.2	96	90-106	
	1112676-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112669-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112674-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112670-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112673-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112672-BS1	11/9/11	11/9/11	50	48	96	90-106	
	1112675-BS1	11/9/11	11/9/11	50	47.9	96	90-106	
	1112733-BS1	11/9/11	11/9/11	50	51.1	102	90-106	
	1112847-BS1	11/12/11	11/12/11	50	47.8	96	90-106	

LAB: TriMatrix Laboratories, Inc.
CHART: MS %R
ANALYTE: CHLORIDE
ANALYSES: Chloride 4500-Cl E
MATRICES: Soil, Waste Water, Water
PRINTED: May-04-12 12:23 by RDW
All Clients/Projects [11/1/2011 to 12/31/2011 11:59:59 PM]



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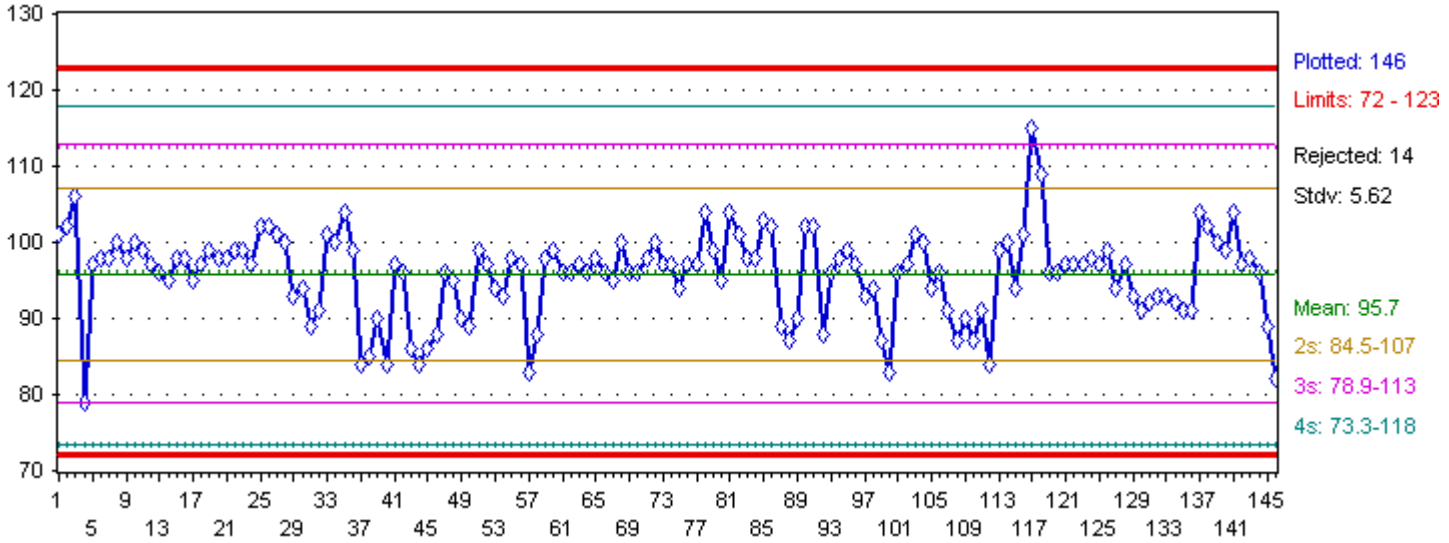
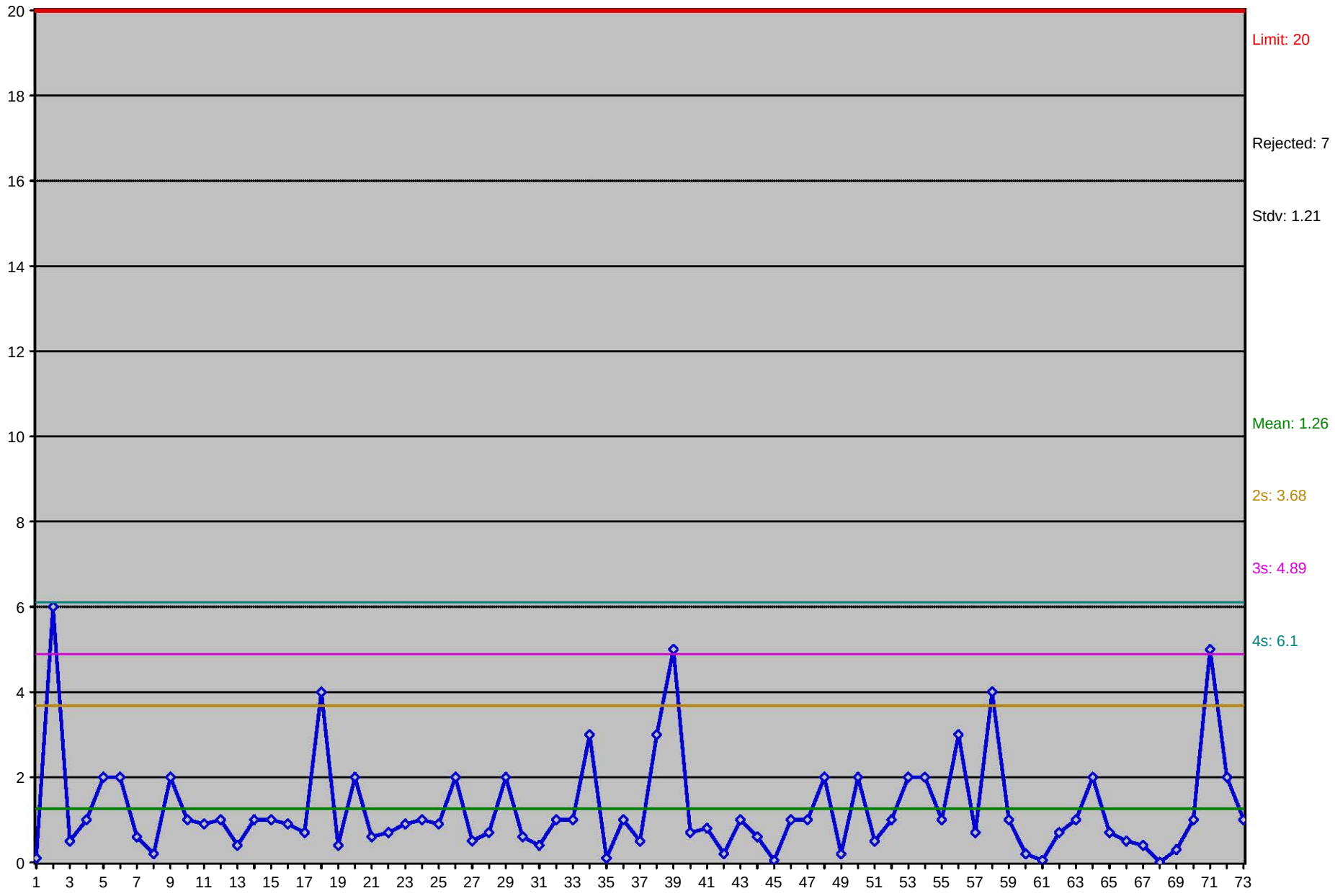
Analyses:	Chloride 4500-Cl E	Analyzed By:	All Analysts
		Extractions:	All Extractions

Chloride ***MS %R***



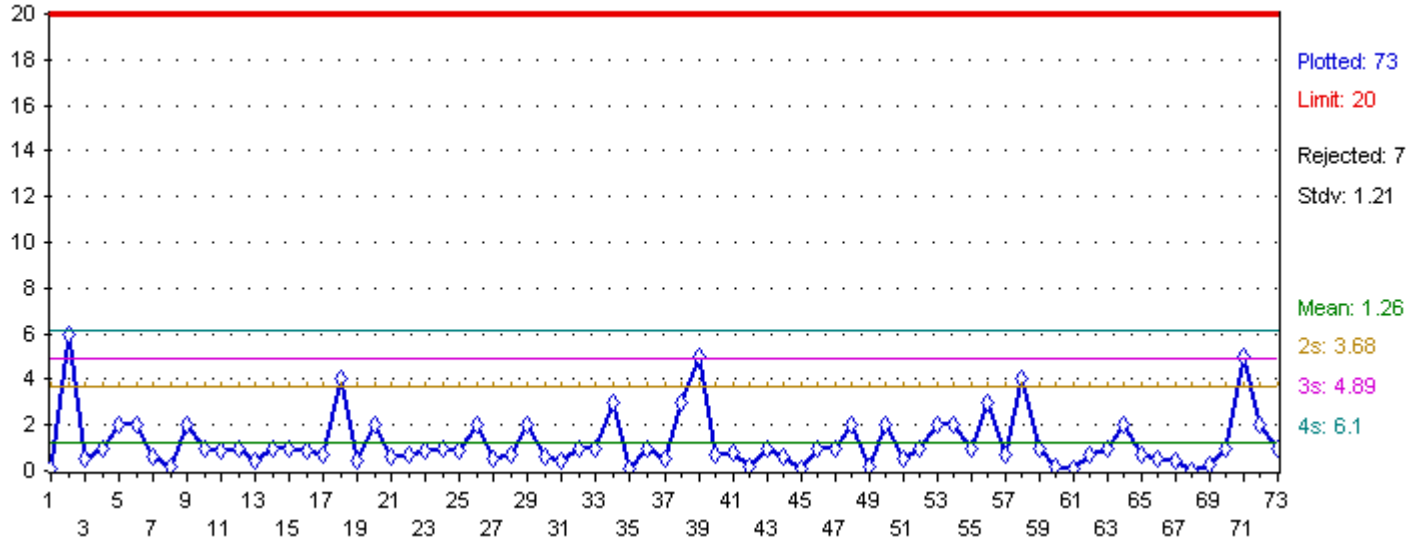
Rjct	Sample ID	Prepared	Analyzed	Spike Level	Result	%R	Source	Limits	Qualifiers
	1112158-MS1	11/1/11	11/1/11	50	56.2	101	1110408-01 (5.52)	72-123	
	1112158-MSD1	11/1/11	11/1/11	50	56.3	102	1110408-01 (5.52)	72-123	
	1112158-MS2	11/1/11	11/1/11	50	215	106	1110409-01 (162)	72-123	
	1112158-MSD2	11/1/11	11/1/11	50	201	79	1110409-01 (162)	72-123	
	1112159-MS1	11/1/11	11/1/11	50	86.1	97	1110415-04 (37.6)	72-123	
	1112159-MSD1	11/1/11	11/1/11	50	86.5	98	1110415-04 (37.6)	72-123	
	1112159-MS2	11/1/11	11/1/11	50	81.4	98	1110415-09 (32.2)	72-123	
	1112159-MSD2	11/1/11	11/1/11	50	82.2	100	1110415-09 (32.2)	72-123	
	1112160-MS1	11/1/11	11/1/11	50	66	98	1110418-12 (17.1)	72-123	
	1112160-MSD1	11/1/11	11/1/11	50	67.2	100	1110418-12 (17.1)	72-123	
X	1112162-MS1	11/1/11	11/1/11	50	543	64	1110459-01 (511)	72-123	
X	1112162-MSD1	11/1/11	11/1/11	50	536	50	1110459-01 (511)	72-123	
	1112161-MS1	11/1/11	11/1/11	50	58.9	99	1110454-01 (9.18)	72-123	
	1112161-MSD1	11/1/11	11/1/11	50	57.8	97	1110454-01 (9.18)	72-123	
	1112157-MS1	11/1/11	11/1/11	50	48.9	96	1110471-01 (1)	72-123	
	1112157-MSD1	11/1/11	11/1/11	50	48.6	95	1110471-01 (1)	72-123	
	1112247-MS1	11/2/11	11/2/11	50	85.4	98	1110434-02 (36.5)	72-123	
	1112247-MSD1	11/2/11	11/2/11	50	85.2	98	1110434-02 (36.5)	72-123	
	1112249-MS1	11/2/11	11/2/11	50	48.8	95	1111011-01 (1.04)	72-123	
	1112249-MSD1	11/2/11	11/2/11	50	49.6	97	1111011-01 (1.04)	72-123	
	1112247-MS2	11/2/11	11/2/11	50	65	99	1110455-03 (15.3)	72-123	
	1112247-MSD2	11/2/11	11/2/11	50	64.2	98	1110455-03 (15.3)	72-123	
	1112248-MS1	11/2/11	11/2/11	50	50	98	1110478-05 (1.16)	72-123	
	1112248-MSD1	11/2/11	11/2/11	50	50.5	99	1110478-05 (1.16)	72-123	
	1112400-MS1	11/4/11	11/4/11	50	82	99	1110492-01 (32.7)	72-123	
	1112400-MSD1	11/4/11	11/4/11	50	81.1	97	1110492-01 (32.7)	72-123	
	1112425-MS1	11/5/11	11/5/11	50	52.9	102	1110506-31 (1.62)	72-123	
	1112425-MSD1	11/5/11	11/5/11	50	52.7	102	1110506-31 (1.62)	72-123	
	1112424-MS1	11/5/11	11/5/11	50	52.1	101	1110506-32 (1.5)	72-123	

LAB: TriMatrix Laboratories, Inc.
CHART: MS/MSD RPD
ANALYTE: CHLORIDE
ANALYSES: Chloride 4500-Cl E
MATRICES: Soil, Waste Water, Water
PRINTED: May-04-12 12:24 by RDW
All Clients/Projects [11/1/2011 to 12/31/2011 11:59:59 PM]



Printed:	May-04-12 12:25	Matrices:	All Matrices
Client:	All Clients	Instruments:	All Instruments
Project:	All Projects	Prepared By:	All Extractionists
Analyses:	Chloride 4500-Cl E	Analyzed By:	All Analysts
		Extractions:	All Extractions

Chloride ***MS/MSD RPD***



Rjct	Sample ID	Prepared	Analyzed	Spike Level	Result	%R	Dup	Dup %R	Source	RPD	Limit	Qualifiers
	1112158-MSD1	11/1/11	11/1/11	50	56.3	102	56.2	101	1110408-01 (5.52)	0.1	20	
	1112158-MSD2	11/1/11	11/1/11	50	201	79	215	106	1110409-01 (162)	6	20	
	1112159-MSD1	11/1/11	11/1/11	50	86.5	98	86.1	97	1110415-04 (37.6)	0.5	20	
	1112159-MSD2	11/1/11	11/1/11	50	82.2	100	81.4	98	1110415-09 (32.2)	1	20	
	1112160-MSD1	11/1/11	11/1/11	50	67.2	100	66	98	1110418-12 (17.1)	2	20	
X	1112162-MSD1	11/1/11	11/1/11	50	536	50	543	64	1110459-01 (511)	1	20	
	1112161-MSD1	11/1/11	11/1/11	50	57.8	97	58.9	99	1110454-01 (9.18)	2	20	
	1112157-MSD1	11/1/11	11/1/11	50	48.6	95	48.9	96	1110471-01 (1)	0.6	20	
	1112247-MSD1	11/2/11	11/2/11	50	85.2	98	85.4	98	1110434-02 (36.5)	0.2	20	
	1112249-MSD1	11/2/11	11/2/11	50	49.6	97	48.8	95	1111011-01 (1.04)	2	20	
	1112247-MSD2	11/2/11	11/2/11	50	64.2	98	65	99	1110455-03 (15.3)	1	20	
	1112248-MSD1	11/2/11	11/2/11	50	50.5	99	50	98	1110478-05 (1.16)	0.9	20	
	1112400-MSD1	11/4/11	11/4/11	50	81.1	97	82	99	1110492-01 (32.7)	1	20	
	1112425-MSD1	11/5/11	11/5/11	50	52.7	102	52.9	102	1110506-31 (1.62)	0.4	20	
	1112424-MSD1	11/5/11	11/5/11	50	51.5	100	52.1	101	1110506-32 (1.5)	1	20	
	1112431-MSD1	11/5/11	11/5/11	50	63.3	94	62.5	93	1110511-02 (16.1)	1	20	
	1112430-MSD1	11/5/11	11/5/11	50	95.2	91	94.3	89	1110465-02 (49.6)	0.9	20	
	1112485-MSD1	11/7/11	11/7/11	50	72.9	100	73.4	101	1110575-01 (23.1)	0.7	20	
	1112485-MSD2	11/7/11	11/7/11	50	63.1	99	65.5	104	1110575-03 (13.4)	4	20	
	1112485-MSD3	11/7/11	11/7/11	50	117	85	117	84	1110577-02 (74.6)	0.4	20	
	1112486-MSD1	11/7/11	11/7/11	50	135	84	138	90	1111005-02 (92.6)	2	20	
X	1112483-MSD1	11/7/11	11/7/11	50	541	113	544	118	1110538-04 (485)	0.4	20	
	1112669-MSD1	11/9/11	11/9/11	50	70.1	96	70.6	97	1110553-05 (22.2)	0.6	20	
	1112668-MSD1	11/9/11	11/9/11	50	155	84	156	86	1110535-08 (113)	0.7	20	
	1112670-MSD1	11/9/11	11/9/11	50	145	88	144	86	1110587-11 (101)	0.9	20	
	1112676-MSD1	11/9/11	11/9/11	50	48.3	95	48.8	96	1111034-01 (0.692)	1	20	
	1112670-MSD2	11/9/11	11/9/11	50	87.5	89	88.3	90	1111030-22 (43.2)	0.9	20	
	1112670-MSD3	11/9/11	11/9/11	50	52.5	97	53.3	99	1111031-01 (3.8)	2	20	
	1112672-MSD1	11/9/11	11/9/11	50	78.6	93	79	94	1111032-01 (31.9)	0.5	20	
	1112675-MSD1	11/9/11	11/9/11	50	49.6	97	49.9	98	1111035-07 (0.905)	0.7	20	
X	1112674-MSD1	11/9/11	11/9/11	50	342	93	340	91	1111026-01 (295)	0.3	20	

Appendix Y

TRIMATRIX LABORATORIES

Archived Information Access Log

Date Removed	Name	File	Location	Date Returned

Appendix Z

TRIMATRIX LABORATORIES

Controlled Temperature Unit #55
Daily Log Sheet

Description: Fisher Isotemp Freezer
Model Number: 13-986-148
Serial #: 2017080504449
Location: Volatile Organic Laboratory

Purpose: Volatile Low-Level Soil Samples
Control Windows: Low: ≥ -20° C High: ≤ -7° C
Thermometer #: 184
Thermometer Serial #: 1353

Date	Initials	Time of First Reading	First Reading (°C)	Time of Second Reading	Second Reading (°C)	Weekend Minimum (°C)	Weekend Maximum (°C)	Adjustments/Observations/Comments

Appendix AA

TRIMATRIX LABORATORIES

Daily Balance Calibration Logbook

Balance ID:	204	**Manufacturer:**	Mettler
Balance Type:	Top Loading	**Model Number:**	BB2440
Readability:	0.00	**Serial Number:**	J58563
Area:	Volatiles Laboratory	**Calibration Source:**	External
Location:	South Bench Top	**Calibration Mass (g):**	1000

Date	**Analyst**	**Low Calibration Mass:**	0.50	**High Calibration Mass:**	100.50
		Acceptance Window:	0.48-0.52	**Acceptance Window:**	98.49-102.51
		Mass Observed	**Pass / Fail**	**Mass Observed**	**Pass / Fail**

Appendix AB

Analytical Standard Record

TriMatrix Laboratories, Inc.

1110526

Description:	100ppm bna	Expires:	Oct-17-12
Standard Type:	Calibration Standard	Prepared:	Nov-10-11
Solvent:	mecl2 k08s00	Prepared By:	Jodi L. Blouw
Final Volume (mls):	10	Department:	Semivolatiles MS
Vials:	1	Last Edit:	Nov-11-11 09:38 by JLB

Analyte	CAS Number	Concentration	Units
4-Bromophenyl Phenyl Ether	101-55-3	100	ug/mL
2-Chlorophenol	95-57-8	100	ug/mL
2-Ethoxyethanol	110-80-5	100	ug/mL
2-Methylnaphthalene	91-57-6	100	ug/mL
2-Methylphenol	95-48-7	100	ug/mL
2-Nitroaniline	88-74-4	100	ug/mL
2-Nitrophenol	88-75-5	100	ug/mL
3+4-Methylphenol	108-39-4	100	ug/mL
3-Methylphenol	108-39-4	100	ug/mL
Aniline	62-53-3	100	ug/mL
4,6-Dinitro-2-methylphenol	534-52-1	100	ug/mL
2,6-Dinitrotoluene	606-20-2	100	ug/mL
4-Chloro-3-methylphenol	59-50-7	100	ug/mL
4-Chloroaniline	106-47-8	100	ug/mL
4-Chlorophenyl Phenyl Ether	7005-72-3	100	ug/mL
4-Methylphenol	106-44-5	100	ug/mL
4-Nitroaniline	100-01-6	100	ug/mL
4-Nitrophenol	100-02-7	100	ug/mL
Acenaphthene	83-32-9	100	ug/mL
Acenaphthylene	208-96-8	100	ug/mL
1,1'-Biphenyl	92-52-4	100	ug/mL
3-Nitroaniline	99-09-2	100	ug/mL
2,3,4,6-Tetrachlorophenol	58-90-2	100	ug/mL
1,2,4,5-Tetrachlorobenzene	95-94-3	100	ug/mL
1,2,4-Trichlorobenzene	120-82-1	100	ug/mL
1,2-Bis(2-chloroethoxy)ethane	112-26-5	100	ug/mL
1,2-Dichlorobenzene	95-50-1	100	ug/mL
1,2-Dinitrobenzene	528-29-0	100	ug/mL
1,2-Diphenylhydrazine	122-66-7	100	ug/mL
1,3-Dichlorobenzene	541-73-1	100	ug/mL

Reviewed By Date

Analytical Standard Record

TriMatrix Laboratories, Inc.

1110526

1,3-Dinitrobenzene	99-65-0	100	ug/mL
1,4-Dichlorobenzene	106-46-7	100	ug/mL
2-Chloronaphthalene	91-58-7	100	ug/mL
1-Methylnaphthalene	90-12-0	100	ug/mL
2-Chloroaniline	95-51-2	100	ug/mL
2,3,5,6-Tetrachlorophenol	935-95-5	100	ug/mL
2,4,5-Trichlorophenol	95-95-4	100	ug/mL
2,4,6-Trichlorophenol	88-06-2	100	ug/mL
2,4-Dichlorophenol	120-83-2	100	ug/mL
2,4-Dimethylphenol	105-67-9	100	ug/mL
2,4-Dinitrophenol	51-28-5	100	ug/mL
2,4-Dinitrotoluene	121-14-2	100	ug/mL
2,6-Dichlorophenol	87-65-0	100	ug/mL
Anthracene	120-12-7	100	ug/mL
1,4-Dinitrobenzene	100-25-4	100	ug/mL
Isophorone	78-59-1	100	ug/mL
Diethyl Phthalate	84-66-2	100	ug/mL
Dimethyl Phthalate	131-11-3	100	ug/mL
Diphenylamine	122-39-4	100	ug/mL
Fluoranthene	206-44-0	100	ug/mL
Fluorene	86-73-7	100	ug/mL
Hexachlorobenzene	118-74-1	100	ug/mL
Hexachlorobutadiene	87-68-3	100	ug/mL
Hexachlorocyclopentadiene	77-47-4	100	ug/mL
Acetophenone	98-86-2	100	ug/mL
Indeno(1,2,3-cd)pyrene	193-39-5	100	ug/mL
Dibenz(a,h)anthracene	53-70-3	100	ug/mL
N-Nitroso-di-n-propylamine	621-64-7	100	ug/mL
N-Nitroso-dimethylamine	62-75-9	100	ug/mL
N-Nitroso-diphenylamine	86-30-6	100	ug/mL
Naphthalene	91-20-3	100	ug/mL
Nitrobenzene	98-95-3	100	ug/mL
Pentachlorophenol	87-86-5	100	ug/mL
Phenanthrene	85-01-8	100	ug/mL
Phenol	108-95-2	100	ug/mL
Pyrene	129-00-0	100	ug/mL
Hexachloroethane	67-72-1	100	ug/mL
Bis(2-chloroethyl) Ether	111-44-4	100	ug/mL
Atrazine	1912-24-9	100	ug/mL

Reviewed By Date

Analytical Standard Record

TriMatrix Laboratories, Inc.

1110526

Benzaldehyde	100-52-7	100	ug/mL
Benzo(a)anthracene	56-55-3	100	ug/mL
Benzo(a)pyrene	50-32-8	100	ug/mL
Benzo(b)fluoranthene	205-99-2	100	ug/mL
Benzo(g,h,i)perylene	191-24-2	100	ug/mL
Benzo(k)fluoranthene	207-08-9	100	ug/mL
Benzoic Acid	65-85-0	200	ug/mL
Benzyl Alcohol	100-51-6	100	ug/mL
Dicyclohexyl phthalate	84-61-7	100	ug/mL
Bis(2-chloroethoxy)methane	111-91-1	100	ug/mL
Dibenzofuran	132-64-9	100	ug/mL
Bis(2-chloroisopropyl) Ether	108-60-1	100	ug/mL
Bis(2-ethylhexyl) Phthalate	117-81-7	100	ug/mL
Butyl Benzyl Phthalate	85-68-7	100	ug/mL
Caprolactam	105-60-2	100	ug/mL
Carbazole	86-74-8	100	ug/mL
Chrysene	218-01-9	100	ug/mL
Di-n-butyl Phthalate	84-74-2	100	ug/mL
Di-n-octyl Phthalate	117-84-0	100	ug/mL
Pyridine	110-86-1	100	ug/mL
Bis(2-chloroethoxy)ethane	112-26-5	100	ug/mL

Parent Standards used in this standard:

Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
1100928	Benzoic Acid, SVMS	Oct-20-11	** Vendor **	Apr-30-15	Oct-20-11 08:10 by RGJ	1
1100929	8270 mega mix	Oct-20-11	** Vendor **	Mar-31-13	Oct-20-11 08:12 by RGJ	1
1101009	2-Ethoxyethanol	Oct-21-11	** Vendor **	Oct-17-14	Oct-21-11 14:01 by RGJ	1
1101010	1,2-bis(2-Chloroethoxy)ethane	Oct-21-11	** Vendor **	Oct-17-14	Oct-21-11 14:02 by RGJ	1
1101011	1,2,4,5-Tetrachlorobenzene	Oct-21-11	** Vendor **	Oct-17-14	Oct-21-11 14:03 by RGJ	1
1101012	2,6-Dichlorophenol	Oct-21-11	** Vendor **	Oct-17-14	Oct-21-11 14:04 by RGJ	1
1101014	SV-041 5 Compounds	Oct-21-11	** Vendor **	Oct-17-13	Oct-21-11 14:06 by RGJ	0.5
1101018	Dicyclohexyl phthalate	Oct-21-11	** Vendor **	Oct-17-12	Oct-21-11 14:08 by RGJ	1
1101023	2-Chloroaniline solution	Oct-21-11	** Vendor **	Oct-17-14	Oct-21-11 14:09 by RGJ	1

Reviewed By Date

Appendix AC

TRIMATRIX LABORATORIES

Metals Laboratory Spiking Pipet Calibration Logbook

Pipet ID	Calibration Volume	Acceptance Window (g)	Date: Initials:		Date: Initials:		Date: Initials:		Date: Initials:		Date: Initials:	
			g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail
SPK-5	10 uL	0.0096 - 0.0104										
	25 uL	0.0245 - 0.0255										
	50 uL	0.0485 - 0.0515										
	100 uL	0.0982 - 0.1018										
B-8	20 uL	0.0192 - 0.0208										
	50 uL	0.0495 - 0.0505										
	100 uL	0.0981 - 0.1019										
SPK-16	100 uL	0.0953 - 0.1047										
	200 uL	0.1944 - 0.2056										
	250 uL	0.2457 - 0.2543										
	300 uL	0.2918 - 0.3082										
	500 uL	0.4922 - 0.5078										
	1000 uL	0.9641 - 1.0359										
SPK-17	200 uL	0.1905 - 0.2095										
	500 uL	0.4911 - 0.5089										
	1000 uL	0.9863 - 1.0137										
SPK-18	100 uL	0.0930 - 0.1070										
	200 uL	0.1912 - 0.2088										
	250 uL	0.2408 - 0.2592										
	300 uL	0.2885 - 0.3115										
	500 uL	0.4853 - 0.5147										
	1000 uL	0.9659 - 1.0341										

Appendix AD

TRIMATRIX LABORATORIES

STANDARD OPERATING PROCEDURE

Block Digestion of Aqueous Samples and Extracts for Total/Dissolved Metals by ICPMS

SW-846 Method 3020A

UNCONTROLLED COPY

APPROVALS:

Area Supervisor: Marge A Scott Date: 10-03-11
Marge A. Scott

QA Officer: Tom C. Boocher Date: 10-3-11
Tom C. Boocher

President: Douglas E. Kriscunas Date: 10-3-11
Douglas E. Kriscunas

Procedure Number: GR-01-148
Revision Number: 0.4

Date Initiated: 12/3/01
Effective Date: 10/20/11

Date Revised: 10/3/11
Pages Revised: All

By: Marge A. Scott

Total Number of Pages: 13

If signed below, the last annual review required no procedural revision.

Date Reviewed	Reviewed by	Review Expires

Appendix AE

Subcontractor Qualification Form

Company Information

Laboratory Name:_____

Address:_____

City, State, Zip:_____

Main Phone:_____ Fax:_____ Website:_____

QA Manager:_____ Title:_____ Phone:_____ email:_____

Project Contact :_____ Title:_____ Phone:_____ email:_____

Laboratory Quality Systems

Does the laboratory have a company wide quality assurance manual (QAM)? Yes ☐ No ☐

Do all staff members have training documents (demonstration of capability) for the QAM? Yes ☐ No ☐

Laboratory Certifications

Please check all that apply. Listings for other certifications (federal, state) may be provided as an attachment.

NELAC ☐ DoD ELAP ☐ ISO 17025 ☐ Other: _____

Does the laboratory perform analytical laboratory services in compliance with the Department of Defense Quality Systems Manual (QSM)? Yes No Compliant Version(s):_____

Please list information related to your most recent audit (past two years):

Auditing Agency:_____ Date:_____ Program:_____

Auditing Agency:_____ Date:_____ Program:_____

Auditing Agency:_____ Date:_____ Program:_____

Auditing Agency:_____ Date:_____ Program:_____

Requested Documentation (PDF)

Copies of all referenced laboratory certifications.

Quality Systems Manual (if not certified under NELAC, ISO17025 or DoD ELAP).

Certification

I certify that the information provided on this form is accurate.

Name:_____ Title:_____ Date:_____

Signature:_____

This section for TriMatrix use only

Subcontractor Approved By:_____ Title:_____

Date:_____ Subcontractor Reference ID:_____

5560 Corporate Exchange Court, SE Grand Rapids, MI 49512-5503 Phone: 616.975.4500 Fax: 616.942.7463
Web: www.trimatrixlabs.com

Appendix AF

Sample Collection, Packing and Return

All supplied containers are pre-cleaned and certified to EPA standards; no additional cleaning is required. Because some containers contain preservatives do not rinse or overfill. Removal of some or all of the preservative may result in qualified data. Most of the chemicals used as preservatives are hazardous so please use caution when handling. Do not breathe or come in physical contact with these chemicals.

When conducting soil sampling please clean off any residual soil from the outside of the containers. This will help prevent cross contamination of other samples in the cooler.

Please fill out all sample identification tags as completely as possible.

Please fill out the enclosed Chain-of-Custody (COC) form for adequate sample tracking.

The temperature requirement for the receipt of most environmental samples is above freezing to ≤6° C. Temperatures that exceed this range are subject to qualification and data rejection by regulatory agencies. Following the instructions below provides the best chance of achieving and maintaining this temperature and avoiding qualified data.

- Samples should be collected and placed on ice as soon as possible. It is much more difficult to cool down warm samples. Please provide additional ice if your samples are warm.

- When possible, sample containers should be sealed in zip-lock containers or the plastic bags provided. This separation will aid in preventing cross contamination and protects the sample labels from moisture that could render them illegible.

- Do not overfill the cooler with samples. Overfilling the cooler limits the space available for ice.

- Surround the sides and the tops of the sample containers with loose, crushed, or cubed, ice. Surrounding the samples with ice is the most efficient way of cooling. Do not use Blue Ice. Do not use small individual bags of ice. Do not simply lay a bag of ice on top of the samples.

- Place the temperature blank in a representative location in the cooler (the middle of a bag of ice is not representative).

- Secure all paperwork in a zip-lock bag and place in the cooler. Seal the cooler closed.

- When shipping the coolers back to TriMatrix, complete the appropriate carrier paperwork and attach it to the cooler. Samples shipped during the week for standard overnight delivery typically arrive the next day between 9:00 and 10:00 a.m. Saturday deliveries must be approved by your project chemist. When shipping samples for a Saturday delivery, we recommend using FedEx Priority Overnight service. When doing so, you must select the “Saturday Delivery” option on the FedEx Airbill.

Please call your TriMatrix project chemist at 1-616-975-4500 if you require any further instructions, or to notify them of the pending arrival of any non-scheduled samples.

Thank You,
TriMatrix Laboratories, Inc.

IMPORTANT INFORMATION REGARDING THE COLLECTION OF NON-CHLORINATED DRINKING WATER SAMPLES FOR VOLATILE ORGANICS

Remove the aerator from the faucet. Turn the cold water on and allow the system to flush until the water temperature has stabilized (usually about 3-5 minutes). Reduce the water flow enough so that air bubbles do not pass through the sample as the vial is being filled, or become trapped when the vial is sealed. Slowly fill the sample vials to just overflowing. Each 40 mL vial has been pre-preserved with 0.5 mL of 18% HCl acid preservative. Take care not to flush out the acid. Carefully collect a set of duplicate samples.

CAUTION: The 1:1 HCl is very acidic. Handle with care.

NOTE: If the sample foams vigorously when collected it must be discarded and recollected without the HCl preservative. These samples must be flagged as "not acidified" on the chain of custody.

Seal the vials and mix by inverting repeatedly for 1 minute. Verify that the sealed and mixed vials are bubble and headspace free. Sample data generated from vials received with headspace will require qualification.

Package the samples surrounded by crushed or cubed ice. Blue Ice is not recommended. Samples received by the laboratory the same day they were collected may not have time to reach $\leq 6°$ C. Provided they were packaged correctly using crushed or cubed ice no qualifications will be required. All other samples must be received by the laboratory at $\leq 6°$ C or the data will be qualified accordingly.

Please call 1-616-975-4500 and speak to your project chemist if you have any questions. Thank you.

TRIMATRIX LABORATORIES

IMPORTANT INFORMATION REGARDING THE COLLECTION OF CHLORINATED DRINKING WATER SAMPLES FOR VOLATILE ORGANICS

Remove the aerator from the faucet. Turn the cold water on and allow the system to flush until the water temperature has stabilized (usually about 3-5 minutes). Reduce the water flow enough so that air bubbles do not pass through the sample as the vial is being filled, or become trapped when the vial is sealed. Slowly fill the sample vials to just overflowing. Each 40 mL vial has been pre-preserved with 25 mg of ascorbic acid preservative. Take care not to flush out the acid. Carefully collect three vials for every sample.

Seal the vial labeled "Do NOT Add HCl".

Using the supplied eyedropper and vial of HCl, carefully add 4 drops of HCl to each of the remaining two vials.

CAUTION: The 1:1 HCl is very acidic. Handle with care.

NOTE: It is important that the 4 drops of HCl are added only to the appropriate two vials, and that it is added after sample collection.

NOTE: If the sample foams vigorously when the HCl is added it must be discarded and recollected without the HCl preservative (all three samples will now only contain ascorbic acid). These samples must be flagged as "No HCl Preservative" on the chain of custody.

Seal the remaining two vials and mix all three by inverting repeatedly for 1 minute. Verify that the sealed and mixed vials are bubble and headspace free. Sample data generated from vials received with headspace will require qualification.

Package the samples surrounded by crushed or cubed ice. Blue Ice is not recommended. Samples received by the laboratory the same day they were collected may not have time to reach $\leq 6°$ C. Provided they were packaged correctly using crushed or cubed ice no qualifications will be required. All other samples must be received by the laboratory at $\leq 6°$ C or the data will be qualified accordingly.

Please call 1-616-975-4500 and speak to your project chemist if you have any questions. Thank you.

Dissolved Sulfide Sample Collection and Preservation

To measure dissolved sulfide, insoluble matter in the sample must first be removed. This is accomplished by producing an aluminum hydroxide floc. The flocculent is allowed to settle and the supernatant decanted off and preserved with zinc acetate and sodium hydroxide.

Supplies

Quantity	*Item*
1 per sample	250 mL amber bottle containing 0.5 mL (10 drops) 6N sodium hydroxide
2 per sample	40 mL vials, each containing 0.1 mL (2 drops) 2N zinc acetate and 0.1 mL (2 drops) 6N sodium hydroxide
2	eye droppers
1	Container of aluminum chloride. Enough has been sent to allow for the addition of 10 drops (0.5 mL) to each 250 mL sample.

Procedure

1.0 Collect the sample in the 250 mL amber bottle containing the sodium hydroxide. Completely fill the bottle (must be enough sample so when capped it is headspace free).

2.0 Immediately add 10 drops of the aluminum chloride solution, cap, and mix by holding the bottle in an upright position and rotating your wrist back and forth for 1 minute.

3.0 Allow the sample to settle for 5 to 15 minutes (long enough to allow the flocculent to settle to the bottom of the bottle but not longer than 15 minutes). Wait only as long as necessary to collect 80 mL of supernatant.

4.0 Carefully decant the supernatant into the (2) 40 mL vials containing the zinc acetate and sodium hydroxide. Completely fill the vials with sample so they are headspace free.

5.0 The sample remaining in the 250 mL amber bottle is caustic. Please return the partially filled bottle to TriMatrix for disposal.

If you have any questions on the treatment procedures described below, please contact your project chemist at 1-616-975-4500.

IMPORTANT INFORMATION FOR
AVAILABLE CYANIDE SAMPLE COLLECTION

Two sample containers must be collected at each sample point. One container will be treated with both lead carbonate and sodium hydroxide, and the second with only sodium hydroxide. A form titled "Available Cyanide Sample Treatment Record" has been provided to document all field pre-treatment activities. Please complete it as you collect and treat each sample.

IMPORTANT: To avoid analyte loss it is **required** that all sample treatments occur within 15 minutes of sample collection.

CAUTION: All containers labeled as Sodium Hydroxide and Lead Carbonate/Sodium Hydroxide contain 1.3 mL of 10N sodium hydroxide. This solution is very caustic. Avoid skin contact. Handle with care.

CAUTION: All containers labeled as Lead Carbonate contain 0.25 g of solid lead carbonate. Avoid inhalation and skin contact.

1.0 Sample Collection Equipment

Per Sample
- One disposable vacuum filtration apparatus
- One plastic powder funnel
- One sheet of filter paper
- One bottle labeled Lead Carbonate
- One bottle labeled Lead Carbonate/Sodium Hydroxide
- One bottle labeled Sodium Hydroxide

A hand pump (not provided) is also required to perform this procedure

2.0 Collecting a Lead Carbonate/Sodium Hydroxide Pre-Treated Sample

If the sample contains particulates, begin with section 2.1. If the sample is particulate free, begin with section 2.2.

2.1 Sample Contains Particulate Matter

To avoid the loss of cyanides that may have bonded to the particulate matter, the sample must be filtered prior to the lead carbonate pre-treatment. Using a powder funnel and a sheet of filter paper filter the well mixed sample into the bottle labeled Lead Carbonate. Filter enough sample to fill the bottle up to its neck. Place the used filter paper into the bottle labeled Lead Carbonate/Sodium Hydroxide. Cap the Lead Carbonate bottle and gently swirl to mix the sample and the lead carbonate. The sulfide will react with the lead carbonate and precipitate out as lead sulfide. To prevent the loss of any cyanide through reaction with the precipitated lead sulfide the precipitate must be removed. Filter the solution using the vacuum filtration apparatus. Transfer the filtrate into the Lead Carbonate/Sodium Hydroxide bottle containing the used filter paper. Do not pre-rinse the container or fill to overflowing, as a loss of the particulate matter and sodium hydroxide will result. Proceed to section 3.0.

2.2 Sample Particulate Free

With a minimum of aeration, fill the 250 mL bottle labeled Lead Carbonate up to the neck with sample. Cap and gently swirl to mix the sample and the lead carbonate. The sulfide will react with

the lead carbonate and precipitate out as lead sulfide. To prevent the loss of any cyanide through reaction with the precipitated lead sulfide the precipitate must be removed. Filter the solution using the vacuum filtration apparatus. Transfer the filtrate into the Lead Carbonate/Sodium Hydroxide bottle. Do not pre-rinse the container or fill to overflowing, as a loss of sodium hydroxide will result. Proceed to section 3.0.

3.0 Collecting a Sodium Hydroxide Pre-Treated Sample

With a minimum of aeration fill the 250 mL bottle labeled Sodium Hydroxide with sample. Do not pre-rinse the container or fill to overflowing, as a loss of sodium hydroxide will result.

4.0 Collect all Paperwork and Return the Samples to TriMatrix

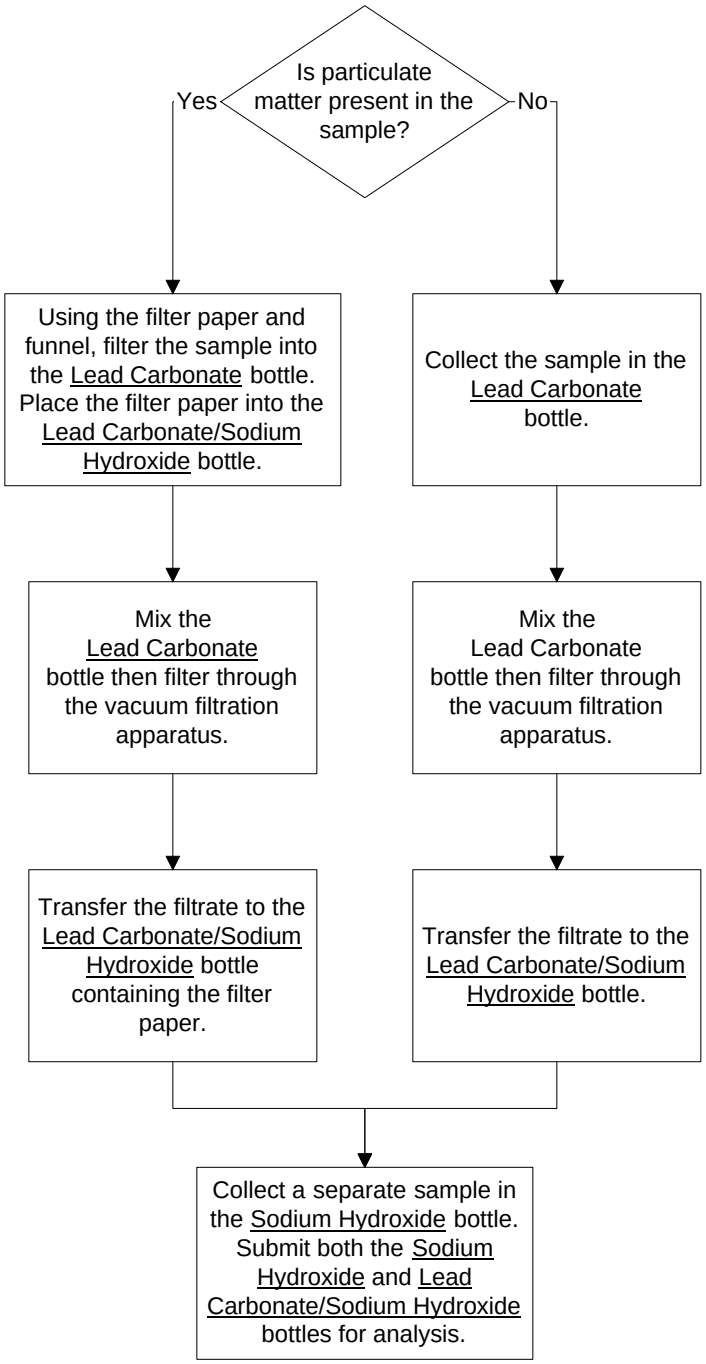
Place all samples in the cooler. Surround the samples with crushed or cubed ice. Do not use chemical refrigerants such as Blue Ice.

IMPORTANT: Samples received by the laboratory the same day they were collected may not have time to reach ≤ 6° C. Provided they were packaged correctly using crushed or cubed ice no qualifications will be required. All other samples must be received by the laboratory at ≤ 6° C or the data will be qualified accordingly.

Seal all paperwork in the re-sealable bag and place the sealed bag in the cooler. Place all plastic powder funnels and unopened vacuum filters in the cooler. Seal the cooler and return it to TriMatrix.

If you have any questions, please call TriMatrix at 1-616-975-4500 and speak with your project chemist.

Available Cyanide Sample Collection Flowchart



TRIMATRIX LABORATORIES

Available Cyanide Sample Treatment Record

Sampled By: _____ **Company:** _____ **Date:** _____

	Sample ID	Time Collected	Did Sample Contain Particulate Matter and Require Filtration?	Sample Combined with Lead Carbonate	Filtrate Combined with Sodium Hydroxide	Time Treatment Completed	Treatment Completed within 15 minutes of Collection?	Preserved Sample Collected
1)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
2)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
3)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
4)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
5)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
6)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
7)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
8)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
9)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
10)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
11)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
12)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
13)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
14)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
15)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
16)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
17)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
18)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No
19)			Yes / No	Yes / No	Yes / No		Yes / No	Yes / No

Appendix AG

TRIMATRIX LABORATORIES
5560 Corporate Exchange Court SE Grand Rapids, MI 49512
Phone (616) 975-4500 Fax (616) 942-7463
www.trimatrixlabs.com

Chain of Custody Record

COC # _____

Page ____ of ____

For Lab Use Only

Cart

VOA Rack/Tray

Receipt Log No.

Project Chemist

Work Order #

Client Name | Project Name

Address | Client Project # / P.O. #

Invoice To ☐ Client ☐ Other (comments)

Phone

Fax

Contact/Report To

Analyses Requested

PRESERVATIVES

A NONE pH 6-8
B HNO_3 pH<2
C H_2SO_4 pH<2
D 1+1 HCl pH<2
E NaOH pH>12
F ZnAc/NaOH pH>9
G MeOH
H Other (note below)

Test Group	Matrix Code	Laboratory Sample Number		Sample ID	Cooler ID	Sample Date	Sample Time	COMP	GRAB	Matrix	Container Type (corresponds to Container Packing List) / Number of Containers Submitted	Total	Sample Comments
			1										
			2										
			3										
			4										
			5										
			6										
			7										
			8										
			9										
			10										

Sampled By (print)

Sampler's Signature

Company

How Shipped? Hand Carrier_____

Tracking No.

Comments

1. Relinquished By	Date	Time	2. Relinquished By	Date	Time	3. Relinquished By	Date	Time
1. Received By	Date	Time	2. Received By	Date	Time	3. Received For Lab By	Date	Time

WHITE COPY - REPORT YELLOW COPY - LABORATORY PINK COPY - FIELD

revision 2.0

Appendix AH

TRIMATRIX LABORATORIES

pH Strip Verification Logbook

Date	Analyst	Lot #	pH 2	pH 4	pH 7	pH 10	Use

pH STRIP CALIBRATION VERIFICATION INSTRUCTIONS AND CRITERIA

1. To be considered acceptable the strip must read the exact pH of the buffer. Use the following table to determine what buffers to use:

Range	Use	pH			
0 - 14	General Laboratory	2	4	7	10
0 - 14	Log-In	2	4	7	10
5 - 10	BOD			7	10
0 - 2.5	Hexavalent Chromium	2			

2. If the pH strip does NOT read correctly at all pH levels then the lot of strips must NOT be used. Return them to purchasing and request another lot be ordered.

Appendix AI

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

The collection of the sample is the starting point for the generation of quality data. It is the responsibility of TriMatrix to provide the client who collects the sample with sample collection instructions, which ensure sample integrity. Also, where applicable TriMatrix also supplies the client with appropriate clean sample containers and preservative chemicals; these glass containers are purchased new and certified as clean and vendors such as QEC and I-Chem Research.

Sampling and Preservation Requirements for certain common environmental analyses are listed in the following table: (NOTE: Holding times are based on EPA guidelines for CLP, NPDES, and RCRA).

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
ORGANICS							
Volatile Halocarbons*	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	8015, 8021, 8260	Yellow/Black
	Water	14 days	4° C	2-40 mL VOA vials	40 mL each	601	Yellow/Black
	Water	14 days	4° C/HCl to pH <2	2-40 mL VOA vials	40 mL each	601, 8015, 8021, 8260	Yellow
	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar	fill the jar	8015, 8021, 8260	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8015, 8021, 8260	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8015, 8021, 8260	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8015, 8021, 8260	Light Yellow
Volatile Aromatics*	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	602	Yellow/Black
	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	602, 8021, 8260	Yellow
	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar or	fill the jar	8021, 8260	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8021, 8260	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8021, 8260	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8021, 8260	Light Yellow
Acrolein*	Water	3 days	4° C	2-40 mL VOA vials	40 mL each	624	Yellow/Black
	Water	14 days	4° C/HCl to pH 4-5	2-40 mL VOA vials	40 mL each	624	Yellow
Acrylonitrile*	Water	14 days	4° C	2-40 mL VOA vials	40 mL each	624	Yellow/Black
	Water	14 days	4°C/HCl to pH 4-5	2-40 mL VOA vials	40 mL each	624	Yellow
TPH-GRO	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	8015	Yellow/Black
	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	8015	Yellow
TPH-GRO/PVOC	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	Wisconsin PUBL-SW-140	Yellow
TPH-GRO	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar or	fill the jar	8015	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8015	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8015	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8015	Light Yellow
TPH-GRO/PVOC	Soil (Encore)	48 hours/21 days	4° C	10 or 25 g Encore	See Table 1 in Method	Wisconsin PUBL-SW-140	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	Wisconsin PUBL-SW-140	Light Yellow
Petroleum Hydrocarbons (DRO)	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	8015	Salmon
	Water	7 days/47 days	4° C/HCl to pH <2.0	1000 mL amber glass bottle	1000 mL	Wisconsin PUBL-SW-141	Gray
	Soil/Waste (High Level Bulk)	14 days/54 days	4° C	60 mL glass jar or	fill the jar	8015	Manila
	Soil/Waste	10 days/47 days	4° C	Tared VOC vial	See Table 1 in Method	Wisconsin PUBL-SW-141	Gray

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Pesticides	Water	7 days/47 days	4° C/pH 5-9	1000 mL amber glass bottle	1000 mL	608	Yellow/White
PCBs	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	608, 8082	Salmon
Methoxychlor	Water	7 days/47 days	4° C/pH 6-8	1000 mL amber glass bottle	1000 mL	608.2	Yellow/White
Pesticides	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8081	Manila
PCBs	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8082	Manila
PCB Oils	Oil	N/A	None	40 mL VOA vial	20 mL	8082	Manila
Organo-phosphorous	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	8141	Salmon
Pesticides	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8141	Manila
Phenoxy Acid Herbicides	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	8151	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8151	Manila
Polynuclear aromatic	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	610, 8100	Salmon
Hydrocarbons*	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8310, 8270	Manila
Acid Extractables	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	8041, 8270	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8041, 8270	Manila
Base/Neutral Extractables	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	8270	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8270	Manila
TCLP-							
Volatiles	Soil/Waste	14 days/28 days	4° C	60 mL glass jar	100 g	1311	Yellow/Black
Semi-Volatiles	Soil/Waste	14 days/21 days/61 days	4° C	125 mL glass jar	250 g	1311	Manila
Metals	Soil/Waste	180 days/360 days (Hg-28 days/56 days)	None	125 mL glass jar	250 g	1311	Manila
Pesticide/Herbicide	Soil/Waste	14 days/21 days/61 days	4° C	125 mL glass jar	250 g	1311	Manila
Dioxins/ Furans	Water	7 days/47 days	4° C	1000 mL amber glass bottle	1000 mL	Screen-625	Salmon
	Soil/Waste	None Required	4° C	60 mL glass jar	fill the jar	Screen-625	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
METALS							
Metals, Total (including phosphorus)	Water	6 months	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	6010/6020/200.7/200.8	Red
Metals, Dissolved (including phosphorus)	Water	6 months	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	6010/6020/200.7/200.8	Red/White Stripe
	Soil/Waste	6 months	None	250 mL plastic bottle	50 g	6010/6020	White
Mercury Cold Vapor	Water	28 days	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	245.1, 7470	Red
	Soil/Waste	28 days	4° C	250 mL plastic bottle	50 g	7471	White
Low-Level	Water	28 days	None	500 mL borosilicate glass bottle**	500 mL	1631	Label on Bag

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
INORGANICS							
Color (Apparent)	Water	48 hours	4° C	125 mL plastic bottle	100 mL	110.2	Green
Color (True)	Water	48 hours	4° C	125 mL plastic bottle	100 mL	110.2	Green
Oil & Grease (HEM and SGT)	Water	28 days	4° C/H_2SO_4 to pH <2.0	1000 mL glass bottle	1000 mL	9070/1664	Dark Blue
	Soil/Waste	28 days	None	60 mL glass jar	50 g	9071	Manila
Specific Conductance	Water	28 days	4° C	125 mL plastic bottle	100 mL	2510 B./120.1/9050	Green
Acidity	Water	14 days	4° C	125 mL plastic bottle	100 mL	2310 B.	Green
pH	Water	24 hours	4° C	125 mL plastic bottle	100 mL	150.1/9041/4500-H B.	Green
	Soil/Waste	24 hours	4° C	60 mL glass jar	50 g	9040/9041/9045	
Alkalinity	Water	14 days	4° C	125 mL plastic bottle	100 mL	310.1/2320 B.	Green
Hardness	Water	6 months	HNO_3 to pH <2.0	125 mL plastic bottle	100 mL	130.2/2340 C.	Red
Biochemical Oxygen Demand (BOD)	Water	48 hours	4° C	1000 mL plastic bottle	1000 mL	5210 B.	Green
Chemical Oxygen Demand (COD)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	410.4/5220 D.	Dark Blue
Chromium (Hexavalent)	Water	24 hours	4° C	500 mL plastic bottle	500 mL	7196A, 3500-Cr B.	Green
	Soil/Waste	30 days/24 hours	4° C	60 mL glass jar	50 g	7196A	Manila
Organic Carbon (TOC)	Water	28 days	4° C/H_2SO_4 to pH <2.0	3-40 mL VOA vials	40 mL	415.1/5310 D./9060	Salmon
	Soil/Waste	28 days	4° C	60 mL glass jar	10 g	MSA 29-3.5.2/415.1/9060	Manila
Ortho-Phosphate	Water	48 hours	4° C	125 mL plastic bottle	100 mL	365.1/4500-P E.	Green
Total Phosphorus	Water	28 days	H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	365.1/4500-P F.	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	365.1/4500-P F.	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Total Kjeldahl Nitrogen (TKN)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	351.2	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	351.2	Manila
Ammonia	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle (500 mL for wastewater)	100 mL (200 mL for wastewater)	350.1/4500-NH_3 G.	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	350.1/4500-NH_3 G.	Manila
Nitrite	Water	48 hours	4° C	125 mL plastic bottle	100 mL	300.0/9056/353.2/354.1/ 4500 NO_2-B/4500 NO_2-F	Green
	Soil/Waste	28 days/48 hours	4° C	60 mL glass jar	50 g	353.2/9056	Manila
Nitrate	Water	48 hours	4° C	125 mL plastic bottle	100 mL	300.0/9056/353.2/4500 NO_3-F	Green
	Soil/Waste	28 days/48 hours	4° C	60 mL glass jar	50 g	9056/353.2/4500 NO_3-F	Manila
Nitrite plus Nitrate (No distinction between NO_2 and NO_3)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	353.2/4500 NO_3-F	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	353.2/4500 NO_3-F	Manila
Total Volatile Solids	Water	7 days	4° C	125 mL plastic bottle	100 mL	160.4	Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	2540-G	Manila
Turbidity	Water	48 hours	4° C	125 mL plastic bottle	100 mL	180.1/2130 B.	Green
Sulfate	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/375.4/9038	Green
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	9056/375.2/9038/4500 SO_4-F	Manila
Sulfite	Water	48 hours	4° C/3 mL 1% EDTA	125 mL plastic bottle	100 mL	377.1	Manila
Sulfide, Total	Water	7 days	4° C/Pre-Preserved with Zinc Acetate; NaOH Added in field to pH ≥9	125 mL plastic bottle	100 mL	9034/376.1/376.2/4500 S_2-D 4500 S_2-F	Light Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	9034	Manila
Cyanide*	Water	14 days	4° C/NaOH to pH >12	1000 mL plastic bottle	1000 mL	335.2/335.4/9012/9014	Light Blue
	Soil/Waste	14 days	4° C	60 mL glass jar	50 g	9012/9014	Manila
Cyanide, Available	Water	14 days	1 Lead Carbonate bottle 1 Lead Carbnate/NaOH bottle 1 NaOH bottle	125 mL amber glass bottles	125 mL	OIA-1677	Light Blue

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Coliform Fecal and Total	Water	24 hours	4° C/$Na_2S_2O_3$	Sterile plastic bottle or Whirl-Pak	100 mL	9222-D/9223-B	White
Bromide	Water	28 days	4° C	125 mL plastic bottle	100 mL	9056/ASTM D1246-88	Green
Chloride	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/325.2/4500-Cl E.	Green
	Soil	28 days	4° C	60 mL glass jar	50 g	9056/325.2/4500-Cl E.	Manila
Chlorine Residual	Water	Analyze Immediately	4° C	125 mL plastic bottle	100 mL	HACH-8167	Green
Total Solids (% Moisture)	Water	7 days	4° C	125 mL plastic bottle	100 mL	160.3/2540 B.	Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	3550	Manila
Total Dissolved Solids (TDS)	Water	7 days	4° C	1000 mL plastic bottle	1000 mL	160.1/2540 C.	Green
Total Suspended Solids (TSS)	Water	7 days	4° C	1000 mL plastic bottle	1000 mL	160.2/2540 D.	Green
Fluoride	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/4500-F C.	Green
	Soil	28 days	4° C	60 mL glass jar	50 g	9056	Manila
Organic Halogen (TOX)	Water	28 days	4° C/H_2SO_4 to pH <2.0	500 mL amber glass bottle	500 mL	9020	Lilac
	Soil	28 days	4° C	60 mL glass jar	50 g	9023	Manila
Phenolics	Water	28 days	4° C/H_2SO_4 to pH <2.0	500 mL amber glass bottle	100 mL	420.2/420.4/9066	Brown
	Soil	28 days	4° C	60 mL glass jar	50 g	9066	Manila
Surfactants (MBAS)	Water	48 hours	4° C	1000 mL plastic bottle	400 mL	425.1/5540 C.	Green
Flash Point	Solid/Liquid/Waste	N/A	None	Clear glass wide mouth jar. 60 mL unless otherwisespecified.	100 g	1010/1020	White
	Waste	N/A	None		100 g	1010/1020	White
Corrosivity (pH and Method 1110)	Waste	N/A	None	(Appropriate to Sample) 500 mL glass or plastic bottle	500 mL	9040/9041/1110	White
Paint Filter (Free Liquids)	Soil/Waste	N/A	None	(Appropriate to Sample) 250 mL glass jar or	100 g	9095	White

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
				125 mL plastic bottle			
Radiologicals (Alpha + Beta, Alpha, Beta, Ra 226, Ra 228	Water	6 months	HNO_3 to pH <2.0	1000 mL plastic bottles or 1000 mL glass bottle	1000 mL		White
Reactivity (Releasable CN and S)	Waste	14 days CN, 7 days S	4° C	(Appropriate to Sample 125 mL plastic bottle or 60 mL glass jar	10 g	SW- 846 Chapter 7	White

*Sample must also be preserved with Sodium Thiosulfate or Ascorbic Acid if chlorinated
**All low-level mercury bottles are stored filled with 5 mL of concentrated HCl and Millipore water
NOTE: For Organics parameters, container lid should be Teflon.
NOTE: For Inorganic parameters, container lid should be plastic or Teflon lined.
NOTE: When testing for several like parameters (ICP metals, Ion Chromatograph anions), one container per sample is sufficient. For example, a sample to be tested for the 13 priority pollutant metals needs one 500 mL container.

Appendix AJ

SDGID: Work Order #: 1204360

Client: **Environmental Resource Associates**
Project: **WP PT Samples Spring**

Project Manager: **Rick D. Wilburn**
Date Received: **Apr-20-12 00:00**

Department: **Inorganic - Wet Chemistry** Analysis: _____

Lab Number / Sample Name	*Container*	*Removed by (Signature)*	*Date & Time Removed*	*Date & Time Returned*	*Consumed?*	*Extract Container*
1204360-01 1: Minerals						
1204360-02 2: Hardness						
1204360-03 3: pH						
1204360-04 4: Settleable Solids						
1204360-05 5: Volatile Solids						
1204360-06 6: Simple Nutrients						
1204360-07 7: Complex Nutrients						
1204360-08 8: Nitrite as N						
1204360-09 9: Demand						
1204360-10 10: Oil & Grease						
1204360-13 13: Hexavalent Chromium						
1204360-15 15: Color						
1204360-16 16: Turbidity						
1204360-17 17: Total Cyanide						

Appendix AK

NOTICE

This Piece of Equipment is

OUT OF SERVICE

This piece of equipment has been removed from service for safety or performance reasons. Under NO CIRCUMSTANCES is this equipment to be used while it is flagged as Out of Service. If you have any questions, please ask the party specified below. Thank You.

Removed From Service On: _____

By: _____

Appendix AL

TRIMATRIX LABORATORIES

Non-Conformance Investigation Report

Client:_____ **Work Order Number:**_____

Sample Number(s):_____ **Date Initiated:**_____ **Date Due:**_____

Investigation Resulting From: ☐ Internal Observation ☐ Client Complaint ☑ **Audit** ☐ Failing PT Sample

I. Area of Non-Conformance:

☐ Sample Receiving / Storage ☐ Bottle Prep ☑ **Client Services** / Reporting ☐ Other_____

☐ Inorganic (Wet Chemistry / Metals / **Prep**) Laboratory ☐ Organic (Volatile / Semi-Volatile / Extraction) Laboratory

II. Description of Non-Conformance:

_____

_____

_____

_____

_____

_____ Initiated By:_____

III. Investigation into Non-Conformance:

_____

_____

_____

_____

_____

_____ Initials:_____

IV. Corrective Action:

_____

_____

_____

_____

_____ Initials:_____

V. Follow-Up (if required):

_____

_____

_____

_____ Initials:_____

VI. Reviewed By:

Managerial Approval:_____ **Area Supervisor:**_____

Date Completed:_____

Appendix AM

TRIMATRIX LABORATORIES

Preventive Action Investigation

Initiated By: _____ **Document Control Number:** _____

Date Initiated: _____ **Date Due:** _____

Investigation Resulting From: ☑ Internal Observation ☐ Client Complaint ☐ Audit ☐ Failing PT Sample

I. Area of Preventive Action:

☐ Sample Receiving / Storage ☐ Bottle Prep ☐ Client Services / Reporting ☐ Other _____

☐ Inorganic (Wet Chemistry / Metals) Laboratory ☐ Organic (Volatile / Semi-Volatile / Extraction) Laboratory

II. Description and Proposed Solutions:

III. Action Plan and Implementation Schedule:

_____ Initials: _____ Date: _____

IV. Follow-Up to Monitor Effectiveness:

_____ Initials: _____ Date: _____

V. Reviewed By:

QA Officer: _____ **Area Supervisor:** _____

Date Completed: _____

8.0 GLOSSARY OF TERMS

ABSORBANCE - a measure of the decrease in incident light passing through a sample into the detector. It is defined mathematically as:

$$A = \left(\frac{I\,(solvent)}{I\,(solution)} \right) - \frac{\log Io}{I}$$

ALIQUOT - a measured portion of a field sample taken for analysis.

ANALYSIS DATE/TIME - the date and time of the introduction of the sample, standard, or blank into the analysis system.

ANALYTE - the element or ion an analysis seeks to determine; the component of interest.

ANALYTICAL SAMPLE - any solution or media introduced into an instrument on which an analysis is performed excluding instrument calibration, initial calibration verification, initial calibration blank, continuing calibration verification and continuing calibration blank. Note the following are all defined as analytical samples: undiluted and diluted samples (EPA and non-EPA), predigestion spike samples, duplicate samples, serial dilution samples, analytical spike samples, post-digestion spike samples, interference check samples (ICS), CRDL standard for AA (CRA), CRDL standard for ICP (CRI), laboratory control sample (LCS), method preparation blank (MPB), laboratory fortified blank (LFB), and linear range analysis sample (LRS).

AUTOZERO - zeroing the instrument at the proper wavelength. It is equivalent to running a blank to set the absorbance to zero.

AVERAGE INTENSITY - the average of two different responses from a detector.

BACKGROUND CORRECTION - a technique to compensate for background contribution to the instrument signal in the determination.

BLANK - an analytical sample designed to assess specific sources of laboratory contamination. See individual types of Blanks: Method Blank, Instrument Blank, Storage Blank, and Sulfur Blank.

BATCH - a group of samples prepared at the same time in the same location using the same method.

BREAKDOWN - a measure of the decomposition of certain analytes (i.e. DDT and Endrin) into by-products.

4-BROMOFLUOROBENZENE (BFB) - the compound chosen to establish mass spectral instrument performance for volatile (VOA) analyses.

CALIBRATION - the establishment of an analytical curve based on the measured response of known standards.

CALIBRATION BLANK - a volume of laboratory reagent or other inert carrier matrix.

CALIBRATION STANDARDS - a series of known standards used by the analyst for calibration of the instrument (i.e., preparation of the analytical curve).

CALIBRATION FACTOR (CF) - a measure of the gas chromatographic response of a target analyte to the mass injected during external calibration. The calibration factor is analogous to the Response Factor (RF) calculated during internal calibration.

CASE - a finite, usually predetermined number of samples collected over a given time period from a particular site. Case numbers are assigned by the Sample Management Office. A Case consists of one or more Sample Delivery Groups.

CONTAMINATION - a component of a sample or an extract that is not representative of the environmental source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

CONTINUING CALIBRATION VERIFICATION - analytical standard run at periodic intervals to verify the initial calibration of the system.

CONTRACT REQUIRED DETECTION LIMIT (CRDL) - minimum level of detection acceptable as specified by the project to report.

CONTROL LIMITS - a range within which specified measurement results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliant data be flagged.

CORRELATION COEFFICIENT - the number (r) which indicates the degree of dependence between two variables (concentration - absorbance). The more dependent they are the closer the number (r) is. Determined on the basis of the least squares regression.

DAY - unless otherwise specified, day shall mean calendar day.

DIGESTION LOG - an official record of the sample preparation (digestion).

DISSOLVED METALS - analyte elements which have not been digested prior to analysis and which will pass through a 0.45 um filter.

DRY WEIGHT - the weight of a sample analyzed based on percent solids. The weight after drying in an oven.

DUPLICATE - a second aliquot of sample that is treated the same as the original in order to determine the precision of the collection.

EXTRACTED ION CURRENT PROFILE (EICP) - a plot of ion abundance versus time (or scan number) for ion(s) of specified mass(es).

EXTRACTABLE - a compound that can be partitioned into an organic solvent from the sample matrix and is amenable to gas chromatography. Extractables include semivolatile (BNA) and pesticide/Aroclor compounds.

FIELD BLANK - any sample submitted from the field identified as a blank.

FIELD SAMPLE - Material received to be analyzed that is contained in single or multiple containers and identified by a unique Sample Number.

GAS CHROMATOGRAPH (GC) - the instrument used to separate analytes on a stationary phase within a chromatographic column. The analytes are either volatized directly from the sample (VOA water and low-soil), from the sample extract (VOA medium soil), or injected as an extracted sample (SVOA and PEST). In VOA and SVOA analysis, the compounds are detected by a Mass Spectrometer (MS). In PEST analysis, the compounds are detected by an Electron Capture Detector (ECD). In the screening procedure (all fractions), the Flame Ionization Detector (FID) is used as the detector.

HOLD TIME - the maximum allowable elapsed time expressed in hours or days from the time the sample is collected until the time of its pre-treatment or analysis.

INDEPENDENT STANDARD – an externally prepared standard solution composed of analytes from a different source than those used in the standards for the initial calibration.

INDUCTIVELY COUPLED PLASMA (ICP) - a technique for the simultaneous or sequential multi-element determination of elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic line emission spectra are produced by excitation of the sample in a radio frequency inductively coupled plasma.

IN-HOUSE - at the laboratories facility.

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the instrument.

INJECTION - introduction of the analytical sample into the instrument excitation system for the purpose of measuring concentration of an analyte.

INSTRUMENT CALIBRATION - Series of analytical standards at different specified concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument.

INSTRUMENT DETECTION LIMIT (IDL) - determined by multiplying by three the standard deviation obtained for the analysis of a standard solution (each analyte in reagent water) at a concentration of 3x-5x IDL on three nonconsecutive days with seven consecutive measurements per day.

INSTRUMENT CHECK SAMPLE - a solution containing both interfering and analyte elements of known concentration that can be used to verify background and interelement correction factors.

INSTRUMENT CHECK STANDARD - a multi-element standard of known concentrations prepared by the analyst to monitor and verify instrument performance on a daily basis.

INTERFERENTS - substances which affect the analysis for the element of interest.

INTERNAL STANDARDS - compounds added to analytical and quality control samples at a known concentration prior to analysis. In the methods that require them, internal standards are used as the basis for quantitation of the target compounds.

INSTRUMENT/ANALYTICAL BLANK - a blank designed to determine the level of contamination associated with the analytical instrument.

INSUFFICIENT QUANTITY - when there is not enough volume (water sample) or weight (soil/sediment) to perform any of the required operations: sample analysis or extraction, percent moisture, MS/MSD, etc.

SECOND SOURCE CALIBRATION VERIFICATION (SCV) STANDARD - a standard prepared from a source other than that used to prepare the quantitation standard, and used to verify the initial calibration curve.

BLANK SPIKE - a control sample of known composition. Aqueous and solid laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples received.

LABORATORY RECEIPT DATE - the date on which a sample is received as recorded on the chain of custody.

LINEAR RANGE, LINEAR DYNAMIC RANGE - the concentration range over which the determinative instrument's analytical curve remains linear.

MATRIX - the predominant material of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid).

MATRIX EFFECT - in general, the effect of the particular sample matrix on the constituents with which is contacts. This is particularly pronounced for clay particles which may adsorb chemicals and catalyze reactions. Matrix effects may prevent extraction of target analytes, and may affect surrogate recoveries. In addition, non-target analytes may be extracted from the matrix causing interferences.

MATRIX SPIKE - aliquot of a matrix spiked with known quantities of target compounds and subjected to the entire analytical procedure. Matrix spikes are used to indicate the efficiency of the method on the matrix by measuring the recovery of the spiked analyte.

MATRIX SPIKE DUPLICATE - a second aliquot of the same matrix as the matrix spike (above) that is spiked in order to determine the precision of the method relative to the matrix.

METHOD BLANK - an analytical control consisting of all reagents, internal standards and surrogate standards that are carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background and reagent contamination.

METHOD OF STANDARD ADDITIONS (MSA) - the addition of 3 increments of a standard solution (spikes) to sample aliquots of the same size. Measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-square analysis. The analyte concentration is determined by the absolute value of the x-intercept.

Ideally, the spike volume is low relative to the sample volume (approximately 10% of the volume). Standard addition may counteract matrix effects; it will not counteract special effects. Also referred to as Standard Addition.

m/z - Mass to charge ratio, synonymous with "m/e"

NARRATIVE - portion of the data package which includes laboratory, contract, case and sample number identification, and descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution.

PERCENT DIFFERENCE (%D) - to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference).

PERCENT MOISTURE - an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105° C. The percent moisture determined in this manner also includes contributions from all compounds that may volatilize at or below 105° C, including water.

PERCENT SOLIDS - the proportion of solid in a soil sample determined by drying an aliquot of the sample at 105° C.

PERFORMANCE EVALUATION MIXTURE - a calibration solution of specific analytes used to evaluate both recovery and percent breakdown as measures of performance.

PERFORMANCE TESTING (PT) SAMPLE - a single blind sample of known composition obtained from an external provider for analysis. Used by clients and regulatory agencies to evaluate laboratory performance.

PREPARATION BLANK (reagent blank, method blank) - an analytical control that contains distilled/deionized water and reagents, which is carried through the entire analytical procedure – digested/distilled/extracted and analyzed. An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.

PRIMARY QUANTITATION ION - a specific ion used to quantitate a target analyte.

PROTOCOL - a compilation of procedures to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control.

PURGE AND TRAP (DEVICE) - analytical technique (device) used to isolate volatile (purgeable) organics by stripping the compounds from water or soil by a stream of inert gas, trapping the compounds on an adsorbent such as a porous polymer trap, and thermally desorbing the trapped compounds onto a gas chromatographic column.

PURGEABLES – non-water soluble volatile organic compounds.

QUALITY CONTROL SAMPLE - a solution obtained from an outside source having known concentration values to be used to verify the calibration.

REAGENT BLANK - a volume of deionized, distilled water containing the same reagent matrix as the calibration standards carried through the entire analytical scheme.

REAGENT WATER - water in which an interferent is not observed at or above the minimum detection limit of the parameters of interest.

RECONSTRUCTED ION CHROMATOGRAM (RIC) - a mass spectral graphical representation of the separation achieved by a gas chromatograph; a plot of total ion current versus retention time.

RELATIVE PERCENT DIFFERENCE (RPD) - The relative percent difference is based on the mean of two values, and is reported as an absolute value, i.e., always expressed as a positive number or zero. In contrast, see percent difference.

RELATIVE RETENTION TIME (RRT) - the ratio of the retention time of a compound to that of a standard (such as an internal standard).

$$RRT = \frac{RTc}{RTis}$$

where,

RTc = Retention time for the target or surrogate compound in continuing calibration.

RTis = Retention time for the internal standard in calibration standard or in a sample.

RELATIVE STANDARD DEVIATION (RSD) - the variation of a series of results based on the standard deviation and average. Typically used in the evaluation of initial calibration curves.

$$RSD = \frac{SD}{\text{Average RF}}$$

RESOLUTION - the separation between peaks on a chromatogram, calculated by dividing the depth of the valley between the peaks by the peak height of the smaller peak being resolved, multiplied by 100.

RESPONSE - or Instrumental Response: a measurement of the output of the detector in which the intensity of the signal is proportionate to the concentration detected.

RESPONSE FACTOR (RF) - a measure of the relative response of an analyte compared to an internal standard. The RF is determined by the following equation:

$$RF = \left(\frac{Ax}{Ais} \times \frac{Cis}{Cx} \right)$$

where:

A = area of the characteristic ion measured

C = concentration

is = internal standard

x = analyte of interest

RETENTION TIME (RT) - the time a target analyte is retained on a GC column before elution. The identification of a target analyte is dependent on a target compound's retention time falling within the specified retention time window established for that compound. Retention time is

dependent on the nature of the column's stationary phase, column diameter, temperature, flow rate, and other parameters.

ROUNDING RULES - If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

If the figure following those to be retained is 5, and if there are no known figures beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

If a series of multiple operations is to be performed (add, subtract, divide, multiply), all figures are carried through the calculations. Then the final answer is rounded to the proper number of significant figures.

RUN - a continuous analytical sequence consisting of prepared samples and all associated quality assurance measurements.

SAMPLE - a portion of material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.

SAMPLE NUMBER - a unique identification number designated for each sample. The Sample Number appears on all laboratory documents which contain information on that sample.

SEMIVOLATILE COMPOUNDS - compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.

SENSITIVITY - the slope of the analytical curve, i.e., functional relationship between emission intensity and concentration.

SERIAL DILUTION – a series of dilutions to attain a less concentrated solution.

SOIL - synonymous with soil/sediment or sediment as used herein.

SONICATOR - a device that uses the energy from controlled ultrasound applications to mix, disperse, and dissolve organic materials from a given solid matrix.

SPECTRA - a plot of the mass-to-charge ratio (m/e) versus relative intensity of the ion current.

STORAGE BLANK - a reagent water aliquot stored with samples and analyzed on a weekly basis for VOCs. The storage blank is used to determine the potential for sample contamination occurring during storage.

STOCK SOLUTION - a standard solution prepared from neat materials diluted to derive other standards.

SURROGATES (Surrogate Standard) - for semivolatiles, volatiles and pesticides/Aroclors, compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated, or isotopically labeled compounds not expected to be present in the sample.

SUSPENDED - those particulates in suspension which are retained by a 0.45 um membrane filter.

TENTATIVELY IDENTIFIED COMPOUNDS (TIC) - compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. Up to 30 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

TOTAL METALS – analytes from the sample which have been digested to complete solvency prior to analysis.

TWELVE-HOUR TIME PERIOD - The twelve (12) hour time period for GC/MS system instrument performance check, standards calibration (initial or continuing calibration), and method blank

analysis begins at the moment of injection of the DFTPP or BFB analysis that the laboratory submits as documentation of instrument performance. The time period ends after 12 hours have elapsed according to the system clock. The injection time of the last analyses in the batch must be made within 12 hours of the injection time of BFB of DFTPP.

VOLATILE COMPOUNDS – non-water soluble compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

WET WEIGHT - the mass of a sample aliquot including moisture (un-dried) that is used for analysis.

WIDE BORE CAPILLARY COLUMN - a gas chromatographic column with an internal diameter (ID) that is greater than 0.32 mm. Columns with lesser diameters are classified as capillary columns.